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INDIAN MEDICINAL PLANTS

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INDIAN MEDICINAL PLANTS

PHANEROGAMIA.

CAESALPINIACEAE

Trees, shrubs or rarely herbs. Leaves pinnate or bipinnate, rarely simple or 1-foliolate; stiples mostly absent. Flowers mostly showy, racemose, spicate, or rarely cymose, zygomorphic, rarely subactinomorphic. Sepals 5 or the 2 upper ones connate, mostly free, imbricate or rarely valvate. Petals 5 or fewer or absent, the adaxial (upper) one inside, the others variously imbricate. Stamens mostly 10, very rarely numerous, often free or variously connate. Anthers various, sometimes opening by terminal pores. Ovary superior, 1-celled. Seeds with copious, thin or no endosperm and large embryo.

A. Leaves simple, abruptly bipinnate
  I. Calyx-disk subbasal. Sepals imbricated
    Sutures of pod not winged .... CAESALPINIA.
  II. Calyx-disk subbasal. Sepals valvate
    a. Pod thin, flat .... DELONIX.
    b. Pod lanceolate, flattened .... HAEMATOXYLON.
  III. Calyx-disk placed considerably above the base .... WAGATEA.
B. Leaves simply pinnate. Calyx-tube short. Disk subbasal
  I. Petals 5. Anthers mostly dehiscing by a terminal pore .... CASSIA.
  II. Petals 5. Anthers dehiscing longitudinally .... CYNOMETRA.
  III. Petals none. Stamens 5. Leaves abruptly pinnate .... CERATONIA.
  IV. Petals none. Stamens 10. Sepals usually 5 .... HARDWICKIA.
C. Leaves equally pinnate. Disk at the top of a prolonged calyx-tube
  I. Petals none .... SARACA.
  II. Petals 3-5
    a. Stamens monadelphous, only 3 developed .... TAMARINDUS.
    b. Stamens 5, free, equal .... HUMBOLDTIA.
D. Leaves simple, mostly deeply bilobed .... BAUHINIA.

The members exhibit mostly tonic, astringent, and mucilaginous properties; some have a pectoral, and laxative or cathartic action; others are anthelmintic, antiseptic, antipyretic, styptic.

The following are among the products which have been obtained:—1. acids—ellagic, gallic, illuric, tannic—; 2. carbohydrates—glucose, sucrose, starch—; 3. mucilage—; 4. anthraquinone derivatives—emodin—; 5. gums—copaiba, copal, tolu—; 6. glucosides—brasilin, kaemferin—; 7. enzymes—amylase, catalase, perodixase, protease, urease—; 8. bitter principles—bonducin, sappanin—; 9. dyes—hæmatoxylin—.

OFFICIAL:—*Cassia spp.* (Austria, Italy, Spain); *Cassia acutifolia* Delile (Austria, Belgium, Denmark, France, Germany, Great Britain, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey); *C. angustifolia* Vahl. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States); *C. angustifolia* Vahl. var. *β. Royleana* Bischoff (Switzerland); *C. elongata* Lemaire=*C. angustifolia* Vahl. (Portugal); *C. Fistula* Linn. (Austria, Great Britain, Italy); *C. Fistula* Linn.=*Cathartocarpus Fistula* Pers. (Portugal); *C. obovata* Collad. (France, Italy, Portugal, Spain); *C. Senna* Linn. (Portugal, United States).

Copaiba spp. (Austria, Hungary, Russia, United States); *Copaiba* (*Copaifera*) *spp.* (Switzerland); *C. coriacea* (Martius) O. Kuntze (Hungary, Russia, Switzerland); *C. guyanensis* O. Kuntze (Austria), —(Desfontaines) O. Kuntze (Russia, Switzerland); *C. Langdorffii* (Desf.) O. Kuntze (Hungary); *C. officinalis* Jacquin (Austria),—(L.) Jacquin (Hungary, Russia, Switzerland).

Copaifera spp. (Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Spain, Sweden, Switzerland, Turkey); *C. coriacea* Mart. (Denmark, Germany, Japan); *C. guianensis* Desf. (Denmark, France, Japan, Portugal, Spain, Sweden); *C. guyanensis* Desf. (Germany, Italy); *C. Jacquinii* Desf. (Germany); *C. Langsdorfii* Desf. (Denmark, Spain); *C. Langsdorffii* Desf. (France, Germany, Italy, Portugal); *C. Lansdorfii* Desfont. (Belgium); *C. officinalis* Linn. (Denmark, France, Italy, Japan, Spain, Sweden)=*C. Jacquini* Desfont. (Portugal).

Hæmatoxylon Campechianum Linn. (Austria, Portugal).

Krameria spp. (Spain); *K. argentea* Mart. (France, Spain,

United States); *K. Ixina* var. *granatensis* Triana (France); *K. tomentosa* St. Hil. (Spain); *K. triandra* Ruiz & Pav. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Tamarindus indica Linn. (Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Switzerland, Turkey)=*T. officinalis* Hook.(Portugal); *T. occidentalis* Gaertn. (Portugal).

CAESALPINIA Linn.

Trees or climbing shrubs, unarmed or armed. Leaves large, abruptly pinnate; stipules various. Flowers yellow or red, in axillary or terminal racemes or panicles. Calyx deeply cleft with the disk confined to its base; segments 5, imbricate, the lowest concave or boat-shaped. Petals distinctly clawed, orbicular (rarely oblong), spreading, imbricate, subequal or the uppermost (the inner) smaller than the others. Stamens 10, free, declinate; filaments often villous or glandular at the base; anthers uniform, dehiscing longitudinally. Ovary sessile or subsessile; ovules few. Style filiform, sometimes clavate at the apex; stigma terminal. Pod oblong or ligulate, flat or turgid, indehiscent or dehiscent, smooth or prickly.—Species 60. —Tropical and subtropical.

A. Pod dry, armed on the faces with abundant wiry prickles. Petals narrow
  1. Leaves with a pair of reduced pinnae at the base ...... 1. *C. crista.*
  2. Leaves without reduced stipular pinnae .... 2. *C. jayabo.*

B. Pod dry, naked on the valves, indehiscent or finally dehiscing. Petals broad
  1. Pinnae 4-6. Leaflets 4-6 .... 3. *C. nuga.*
  2. Pinnae 20-24. Leaflets 20-30 .... 4. *C. sappan.*
  3. Pinnae 12-18. Leaflets 20-24 .... 5. *C. pulcherrima.*
  4. Pinnae 12-20. Leaflets 16-24 .... 6. *C. sepiaria.*

C. Pod rather fleshy, indehiscent, naked on the faces. Petals broad.
  1. Leaflets 60-20 .... 7. *C. digyna.*
  2. Leaflets 25-30 pairs .... 8. *C. coriaria.*

Astringent properties. The seeds a powerful tonic and emmenagogue.

The following are used medicinally:—in Malaya—*C. sappan* Linn.—; in Indo China—*C. bonduc* Roxb., *C. bonducella* Flem., *C. pulcherrima* Swartz, *C. sappan* Linn., *C. sepiaria* Roxb.—; in China —*C. sappan* Linn., *C. sepiaria* Roxb.—; in Java *C. bonducella* Flem.—; in the Philippine Islands—*C. bonduc* Roxb., *C. bonducella* Flem., *C. pulcherrima* Swartz, *C. Sappan* Linn.—; in the Molucca Islands—*C. muga* Ait.—; in the West Indies—*C. bonducella* Flem., *C. coriaria* Willd.—; in Brazil—*C. echinata* Lam.—; in Guiana—*C. pulcherrima* Swartz—; in Madagascar and La Reunion—; *C. bonducella* Flem., *C. sepiaria* Roxb.—; in Guinea—*C. bonducella* Flem.—.

1. **Caesalpinia crista** Linn. Sp. Pl. (1753) 380.—*C. bonducella* Fleming in As. Res. XI (1810) 159.—PLATE 343 (under *C. bonducella*).

An extensive climber; branches finely grey-downy, armed with hooked and straight hard yellow prickles. Leaves 30-60 cm. long; petioles prickly; stipules a pair of reduced pinnae at the base of the leaf each furnished with a long mucronate point; pinnae 6-8 pairs, 5-7.5 cm. long, with a pair of hook stipulary spines at the base. Leaflets 6-9 pairs, 2-3.8 by 1.3-2.2 cm., membranous, elliptic-oblong, obtuse, strongly mucronate, glabrous above, more or less puberulous beneath; petiolules very short; stipels of short hooked spines. Flowers in dense (usually spicate) long-peduncled terminal and supraaxillary racemes dense at the top, lax downwards, 15-25 cm. long; pedicels very short in bud, elongating to 5 mm. in flower and 8 mm. in fruit, brown-downy; bracts squarrose, linear, acute, reaching 1 cm. long, fulvous-hairy. Calyx 6-8 mm. long, fulvous-hairy; lobes obovate-oblong, obtuse. Petals oblanceolate, yellow. Filaments declinate, flattened at the base, clothed with long white silky hairs. Pods shortly stalked, oblong, 5-7.5 by 4.5 cm., densely armed on the faces with wiry prickles. Seeds 1-2, oblong, lead-coloured, 1.3 cm. long.

Distribution: Throughout India.—Tropics generally.

The root-bark is good for tumours and for removing the placenta.—The sprouts are useful in the treatment of tumours. The

juice of the leaves is anthelmintic; good in elephantiasis and small pox; destroys the bad odour due to perspiration.—The flower is bitter, heating to the body; cures "kapha" and "vata"; the ash is used in ascites.—The fruit is acrid, heating to the body; astringent to the bowels, aphrodisiac, anthelmintic; cures urinary discharges, leucorrhœa, piles, wounds.—The oil from the fruit is good for indolent ulcers (Ayurveda).

The seed is hot and dry; styptic, antiperiodic, anthelmintic, prevents contagious diseases; cures inflammations; useful in colic, malaria, hydrocele, skin diseases, leprosy (Yunani).

In an official report, the Madras Committee for the proposed revision of the Indian Pharmacopœia, remark that "the seeds are very useful and cheap and antiperiodic, antipyretic, and tonic; valuable in all ordinary cases of simple, continued and intermittent fevers. They have also been found useful in some cases of asthma."

In Madras, an ointment is made from the powdered seeds with castor oil and applied externally in hydrocele and orchitis.

In disorders of the liver, the tender leaves are considered very efficacious. In Cochin China they are reckoned as a deobstruent and emmenagogue; and an oil expressed from them is given in convulsions, palsy, and similar complaints.

In Malaya, the young leaves are used in intermittent fevers, and for expelling intestinal worms. In Ceylon, they are applied for toothache, and they are also given for worms in children.

In La Reunion and Madagascar, the roots are considered febrifuge and anthelmintic; they are much used as an astringent in leucorrhœa and blennorrhagia. The seeds are considered tonic, febrifuge, anthelmintic, antiblennorrhagic, and specific in the treatment of hydrocele. The oil from the seeds is used in convulsions and paralysis. The leaves are a good emmenagogue.

In Guinea, the pounded seeds are considered vesicant; a decoction of the root is prescribed in fever; the boiled leaves are used as a gargle for sore throat.

The powdered seeds were administered mixed with equal part of pepper powder to malarial patients and were found to possess feeble antiperiodic properties. In malignant malaria, they did not

do any good. The leaves and seeds after roasting with castor oil are applied externally to inflammatory swellings especially to inflamed piles, hydrocele, and orchitis with benefit (Koman).

The seeds contain a fairly good percentage of pale yellow thick oil having a disagreeable odour. It has iodine value of 96.1 and saponification value of 292.8. We could not confirm the presence of an alkaloid as noted by the previous investigators, but they contain a non-glucosidal bitter principle insoluble in water which is pharmacologically inactive. According to some authors the quantity of oil varies between 20 to 25 per cent, whereas in our specimen we did not get more than 14 per cent.—As the seeds do not show any marked therapeutic properties and the reinvestigation of their chemical composition does not reveal the presence of any active principles with marked physiological action, further clinical trials were considered unnecessary (Chopra and Ghosh).

The seeds are ground in water and given internally in snake-bite (Brihannighantaratnakara).

The seeds are not an antidote to snake-venom (Mhaskar and Caius).

Tumminkatti and Puntambekar have carried out the chemical examination of the seeds and their oil (*Journ. Ind. Chem. Soc.;* VII, 1930).

Ajmere: Katakaranja, Kilgach—; *Arabic:* Akitmakit, Bunduk, Hajarelukab, Kitmakit—; *Bengal:* Nata, Natakaranja, Natuko-ranza—; *Bombay:* Gaja, Sagurghota—; *Burma:* Kalein, Kaliendza—; *Canarese:* Gajjiga, Gazzaga, Sannagajjiga, Tapasi—; *Ceylon:* Punaikkalaichi—; *Cutch:* Sagaragota—; *Deccan:* Gaja, Gudagega, Gutchka—; *English:* Fever Nut, Indian Filbert, Nickar, Physic Nut—; *Ewe:* Worle—; *French:* Bois canic, Bois ouette, Bonduc, Bonduc gris, Cadoc, Cniquier, Crēte de paon, Pois génic, Pois guénique, Pois quénique, Queniquier, Yeux de chat—; *French Guiana:* Couri—; *Gujarat:* Gajga, Kachki, Kakachia, Kakcha—; *Hausa:* Yayandara—; *Hindi:* Kanja, Kanthekaranja, Karanjava, Karanju, Kathkaranj, Katkaleja, Katkaranga—; *Indo China:* Moc meo mui, Vuot hum—; *Java:* Kalitji, Matahijang—; *Kumaon:* Karaunj—; *La Reunion:*

Cadoque—; *Lepcha:* Kup, Yang, Yangkup—; *Madagascar:* Vatolalaka—; *Malaya:* Buvagore—; *Malayalam:* Avil, Kalanji, Kalimarakam—; *Marathi:* Gajaga, Kanchaki, Karbath, Rohedo, Sagaragota, Sagargota—; *Mundari:* Janum koronjo—; *Oudh:* Kathkarunja—; *Persian:* Finduk, Khayaheiiblis—; *Philippines:* Calambiti—; *Porebunder:* Kakcha—; *Ramnagar:* Karaunj—; *Sadani:* Kataphar—; *Sanskrit:* Kakachika, Kantakini, Karanja, Krakachika, Kuberakshi, Latakaranja, Prakiriya, Putikaranja, Putikaranji, Tinagachhika, Tirini, Valli, Varini—; *Santal:* Bagni—; *Sind:* Karbat, Kirbut— *Sinhalese:* Kumburuatta, Kumburuvel—; *Sundriban:* Nata—; *Tagalog:* Bayagcambing, Calambibit—; *Tamil:* Avil, Gajji, Kachukkai, Kalal, Kalarsi, Kalargodi, Mulal, Suriyindu—; *Telugu:* Gacha, Gachakaya, Gutsakai, Sukajambuka, Tellagacha—; *Tulu:* Gajige—; *Twi:* Abobadwe, Aworaworadwe, Orwareaba—; *Urdu:* Akitmakit, Bunduk—; *Uriya:* Kotokoleja, Nota—; *Visayan:* Dalugdug—.

2. **Caesalpinia jayabo** Maza in Anal. Soc. Esp. Hist. Nat. XIX (189) 234; Merr. in Interpr. Herb. Amb. 261.—*C. bonduc* Baker in Hook. f. Fl. Brit. Ind. II, 255.—PLATE 344A (under *C. bonduc*).

A stout climbing shrub; stems with fine grey pubescence and scattered usually straight small prickles. Leaves very large, main rhachis 12.5-18 cm., cylindrical, finely woolly-pubescent, pinnae 6-8 pairs, 3.8-6.3 cm., spreading nearly at right angles, all with numerous hooked prickles, usually in pairs on the under surface; no stipules. Leaflets numerous, 10-14 (5-7 pairs) to each pinna, very shortly stalked, oval or oblong-oval, rounded at base, obtuse, strongly mucronate, glabrous above, pubescent on midrib and margin beneath. Flowers moderate sized, articulated with pedicels; pedicels as long as calyx, pubescent, bracts linear, longer than the calyx, caducous, racemes long-stalked, pyramidal; calyx densely tomentose-pubescent. Pod shortly stalked, 6.3-9 cm. by 3.8 cm. wide, ovoid, compressed, pubescent and covered with very numerous long sharp spines, dehiscent. Seeds 1-3, nearly globular, 2 cm., with a long funicle, smooth, greenish grey.

Distribution: E. and W. Peninsula, Ceylon.—Malaya, Polynesia, W. Indies.

In Indo China, the bitter leaves are used as an emmenagogue; the root is prescribed in dysentery.

Arabic: Bunduk—; *Canarese:* Gajjiga, Heggajjiga, Kitta—; *Ceylon:* Punaikkalaichi—; *English:* Bezoar Nut, Bonduc Nut, Marble Bean, Sumatra Nicker—; *French:* Bonduc jaune—; *Indo China:* Moc meo, Vuot hum—; *Malayalam:* Kalanji—; *Sinhalese:* Kumburuvel—; *Tagalog:* Bagaycambig, Camotcabag—; *Tamil:* Kachuram, Kalal, Kalarsi, Kalargodi, Kalarsikkodi, Karchuram—; *Telugu:* Gacha—; *Visayan:* Bugtong—.

3. **Caesalpinia nuga** Ait. Hort. Kew. ed. 2, III (1811) 32. —Plate 345.

A large woody climber, bark rough, fibrous, yellowish grey, young branches glabrous, dark green, distantly set with extremely sharp hooked black prickles which are persistent and become ultimately raised on a mamilliform corky base. Leaves large, main rhachis about 12.5 cm., pinnae 2 pairs, all smooth and polished, cylindrical with very small, sharp, hooked prickles beneath at the insertion of the leaflets; leaflets 4, rarely 6 (2 or 3 pairs) distinctly stalked, distant, 5-6.3 cm., ovate-oval, obtuse, glabrous, paler beneath. Flowers on rather long pedicels, racemes or panicles terminal and axillary, buds globular; calyx glabrous, segments very obtuse; filaments hairy in lower half. Pod 5.7-6.3 cm. by 3.2 cm. wide, flattened, tapering at base to very short stalk, sharply beaked, glabrous, dark brown, leathery-woolly, slowly dehiscent. Seed solitary, oval-rotund, compressed, over 2 cm., smooth, purplish brown.

Distribution: All through the E. tropics.

The roots of this plant are said to be diuretic; they have been reported as useful in gravel and stone in the bladder, and the juice of the stem has been used externally and internally in eye diseases. For the same purpose are used also the roasted fruits, which have a bitter taste. The finely powdered leaves have also been administered to women immediately after delivery as a tonic to the uterus.

Burma: Sakauk, Sugauk—; *Malayalam:* Kakamullu, Kakumulla—; *Sinhalese:* Deyavavulatteya, Diyawawuletiya—; *Sundaw:*

Aroci-mata-hiang—; *Sundriban:* Netu, Shingrilota—; *Tagalog:* Cabitcabag, Camitcabag, Sapinit—; *Telugu:* Mulutige—; *Visayan:* Sapinit—.

4. **Caesalpinia sappan** Linn. Sp. Pl. (1753) 381.—Plate 344B.

A tree 6-9 m. high; stem prickly, 15-25 cm. diam.; branches rufous-pubescent, armed with a few small prickles. Leaves 20-38 cm. long; pinnae 8-12 pairs, 10-15 cm. long, subsessile, with small prickles at the base. Leaflets 10-18 pairs, 1.3-2 by 1 cm., subsessile, close, oblong, rounded at the apex, attached at the lowest corner, very inequilateral (the upper side much the largest), glabrous above, more or less puberulous beneath. Flowers in panicles, which are terminal and in the axils of the upper leaves, 30-40 cm. long; pedicels 1.3-1.5 cm. long; bracts lanceolate, 8 mm. long, caducous. Calyx 11 mm. long, leathery, glabrous. Corolla 2 cm. across; petals orbicular, subequal, yellow, the upper with a red spot at the base. Stamens declinate, waxy-white; filaments densely woolly at the base. Ovary grey-velvety. Pods 7.5-10 by 3.8-5 cm., woody, obliquely oblong, subcompressed, polished, indehiscent, with a hard recurved short beak at the upper angle of the obtuse apex. Seeds 3-4.

Distribution: Believed to be wild in the Shan Hills; E. and W. Peninsula, Pegu.—Malaya.

The wood is bitter, dry, sour, cooling; cures "vata", biliousness, fevers, delirium, ulcers, strangury, urinary concretions, blood complaints; improves the complexion (Ayurveda).

The wood is very bitter; stops bleeding from the chest and lungs; heals wounds, ulcers; improves the complexion; useful in rheumatism (Yunani).

A decoction of the wood is considered a powerful emmenagogue. It is used as such in Indo China.

Given internally as a decoction the wood is useful in some forms of skin diseases, lichen especially.

In China, the wood is used as a vulnerary for wounds, hæmorrhages, and disturbance of the menstrual functions. It is also considered astringent and sedative.

A decoction of the wood is said to be very useful in curing dysentery and diarrhœa. I have given it an extended trial and found to give relief in mild cases of dysentery and diarrhœa (Koman).

Arabic: Baggam—; *Bengal:* Bakam, Patang, Tairi—; *Burma:* Tainniya, Teinnyet—; *Cambodia:* Sbeng—; *Canarese:* Patranga, Pattanga, Sappanga—; *Chinese:* Su Fang Mu, Su Mu—; *Deccan:* Patang—; *English:* Brazil Wood, Buckum, Sappan Wood—; *French:* Bois de Sappan, Brésillet des Indes—; *Gujerati:* Bakam, Patang—; *Hindi:* Bakam, Patang, Tairi—; *Ilocano:* Sapang—; *Indo China:* Go vang, Sbeng, To moc, To phuong, Vang nhuom—; *Malaya:* Davon setjang, Soo mook, Su mu, Sepang—; *Malayalam:* Patrangam, Sappannam—; *Marathi:* Patang—; *Persian* Bakam—; *Sanskrit:* Bharyavriksha, Kashtha, Kuchandana, Lohitaranga, Patanga, Patranga, Pattaranga, Pattaranjaka, Pattranya, Pattura, Raktaka, Raktakashtha, Raktasar, Ranjana, Rogakashtha, Suranga, Surangada—; *Santal:* Teri—; *Sinhalese:* Patangi—; *Spanish:* Palo de Brazil—; *Tagalog:* Sapang, Sibucao—; *Tamil:* Padangam, Patungam, Sappangu, Varattangi—; *Telugu:* Bakanu, Bakapu, Bukkamu, Kapuramaddi, Okanu, Patanga—; *Tulu:* Sappanga—; *Urdu:* Bakam—; *Uriya:* Bakomo—; *Visayan:* Sibucao—.

5. **Caesalpinia pulcherrima** Swartz Obs. 166.—PLATE 346.

A shrub or small tree. Prickles few and scattered on the branches. Pinnae 12-18, leaflets 20-24, sessile, close, membranous, 1.3-2 cm. long, not so oblique as in *C. sappan,* very obtuse. Racemes very broad, the lower pedicels 7.5-10 cm. long. Calyx 1.3-1.6 cm., glabrous. Petals round, crisped, reddish yellow, with a very distinct claw, the largest and most showy of all the species. Stamens much exserted. Filaments bright red, 3-4 times the length of the corolla. Pod thin ligulate flat glabrous 6-8-seeded, nearly straight; 5-7.5 cm. long, the narrowest and thinnest of that of any of the species.

Distribution: Native country uncertain, may have come from America. Universally cultivated throughout India.

The plant is oily, refrigerant; cures "tridosha" fevers, "vata", ulcers, tumours (Ayurveda).

1 cm. long, ovate-lanceolate, densely pubescent, caducous. Calyx 1-1.25 cm. long, densely pubescent; the upper sepals oblong, very obtuse, pubescent on both sides. Corolla 1.3-2.2 cm. across; petals suborbicular, bright yellow, the lower about 1.3 cm., the upper 6 mm. diam. Stamens declinate; filaments densely woolly in the lower half. Pods 7.5-11.5 by 2.5-2.8 cm., straight or slightly recurved, linear-oblong, with a long beak, not stalked, somewhat turgid, reticulately veined, especially on the lower half, narrowly winged, the faces depressed between the seeds. Seeds 6-8, greenish, mottled.

Distribution: Throughout India, Ceylon.—Malaya, China, Japan.

The leaves are sweetish; laxative, tonic, carminative, antipyretic, emmenagogue; useful in biliousness (Yunani).

In Chamba, the bruised leaves are applied to burns (Stewart).

The root is used as a purgative in China.

In La Reunion, the leaves are considered emmenagogue.

In Madagascar, the root is used as an emmenagogue; a concentrated infusion of the leaves is prescribed as a potent emetocathartic.

Betsileo: Roimbazaha, Roinaombelahy, Roinombilahy—; *Bias:* Andi, Arlei, Daghauri—; *Bombay:* Chillara: Chillur—; *Burma:* Sukyanbo—; *Canarese:* Gajalige, Hotasige, Hotsige, Hunnulla, Kenjige, Kurudugajjida, Kurutugajjika—; *Chenab:* Dodur—; *Chinese:* Yun Shih—; *Dehra Dun:* Alai—; *English:* Bahama Sappan, Black Bonduc, Mysore Thorn—; *Garhwal:* Airi, Kingari—; *Gujarat:* Chilar—; *Hindi:* Aila, Arlu, Kando, Karanj, Relu, Uri, Urn—; *Hova:* Raimemy, Tsiafakomby—; *Indo China:* Van Thuc, Vuot hum—; *Jaunsar:* Ari—; *Jhelum:* Phulvai, Uran—; *Kashmir:* Kando—; *Kikuyu:* Mubagi—; *La Reunion:* Sappan—; *Madagascar:* Retient-boeufs, Sapan—; *Malayalam:* Inna—; *Marathi:* Chillara, Chillari, Chillur—; *Meru:* Muichosi—; *Punjab:* Karur, Relan—; *Raniket:* Airi—; *Ravi:* Didrian, Relme—; *Sutlej:* Ongwa—; *Tamil:* Indu, Kadiyindu, Pulitadukki, Pulittodakki—; *Telugu:* Gaddakorinda—; *Urdu:* Aila—; *Uriya:* Gilo, Godhchili—.

7. **Caesalpinia digyna** Rottl. in Ges. Natur. Fr. Neue Schr. IV (1803) 200.—PLATE 348.

A large scandent prickly shrub; the branchlets minutely puberulous or velvety. Leaves abruptly bipinnate, 15-23 cm. long, with 5-8 pairs of pinnae, the rhachis minutely and slightly puberulous or glabrous, sparingly prickly. Leaflets in 6-10 pairs, unequally oblong, oblique at the base, almost sessile, blunt, up to 1.3 cm. long, glabrous, membranous, pale-coloured beneath. Flowers middling-sized, yellow (the petals often reddish at the base), on very slender about 2.5 cm. long pedicels, forming rather long glabrous racemes in the axils of the leaves. Calyx and corolla glabrous; filaments white (when dry tawny), woolly. Ovary glabrous. Pods 2.5-5 cm. long, glabrous, torulose, oblong-lanceolate 1-3-seeded, coriaceous and tardily dehiscing in 2 valves. Seeds oblong, not compressed, black.

Distribution: E. Himalaya, E. and W. Peninsulas, Ceylon.—Malay Islands.

The root has marked astringent properties. It is given internally in phthisis and scrofulous affections; when sores exist, it is applied externally as well. It is also used in diabetes.

In some parts of Burma the root, pounded and mixed with water, is drunk as a febrifuge. It is said to have an intoxicating effect.

Bengal: Umulkuchi—; *Bombay:* Vakerichebhate, Vakerimula—; *Burma:* Sunletthe—; *Hindi:* Vakerimul—; *Mundari:* Bakaininari, Bakarinari—; *Telugu:* Nunegacha—; *Uriya:* Gilo—.

8. **Caesalpinia coriaria** Willd. Sp. Pl. II (1753) 532.

A small tree. Stem without prickles. Leaves with 6-8 pairs of pinnae. Pinnae with many small leaflets 25-30 pairs approaching those of an Acacia in general appearance. Flowers small, light yellow or green, sweet-scented, in short dense panicles. Pods thick, twisted, not covered with prickles.

Distribution: W. Indies.

The pods are astringent. The powder of the pods is astringent, antiperiodic, and tonic. A decoction is used for washing bleeding piles.

The bark is antiperiodic and used in chronic fevers.

Arabic: Sumaqueamriquah—; *Bombay:* Libidibi—; *Canarese:* Dividivi, Vilayatiyaldekayi—; *Deccan:* Amriquekasumaq—; *English:* American Sumach, Dividivi—; *French:* Libidibi—; *Madras:* Ingimaram—; *Persian:* Sumaqueamriquah—; *Tamil:* Kodichittal, Kodivelam, Konakkay, Konvel, Mullilladavel, Tividivi—; *Telugu:* Dividivi, Dividivitumma—; *Tulu:* Dividivi—.

Delonix Raf.

Erect unarmed trees. Leaves abruptly bipinnate; leaflets many, small; stipules small; stipels 0. Flowers large, showy, in terminal corymbs; bracts small, caducous; bracteoles 0. Calyx-tube very short; lobes 5, valvate, subequal. Petals 5, orbicular, imbricate, clawed, subequal or the uppermost dissimilar; margins fimbriate. Stamens 10, free, declinate, long-exserted; filaments villous below; anthers uniform. Ovary subsessile, many-ovuled; style filiform; stigma truncate, ciliolate. Pod elongate, flat, woody, dehiscent. Seeds transverse, oblong.—Species about 3.—Tropical Asia and Africa.

The genus is therapeutically inert.

1. **Delonix elata** Gamble Fl. Madras 396.—*Poinciana elata* Linn. Cent. Pl. II (1756) 16; Bedd. Fl. Sylv. t. 178.

An erect tree 6-9 m. high; bark tolerably smooth, ash-coloured. Leaves abruptly 2-pinnate, 10-20 cm. long; main rhachis slender; pinnae 4-8 pairs, opposite. Leaflets 10-20 pairs, subsessile, 3 by 8 mm., closely set along the rhachis, linear-oblong, rounded and usually apiculate at the apex, glabrous, caducous. Flowers in terminal few-flowered corymbiform racemes; pedicels stout, finely pubescent. Calyx 2-2.5 cm. long, coriaceous, silky-pubescent outside; segments linear-oblong, acute. Petals suborbicular, yellow, scarcely exserted, the upper a little smaller and of a deeper colour than the others, the margins of all much curled. Filaments often 6.3 cm. long, villous and thickened at the base. Pods 12.5-18 by 2-3.2 cm., attenuated at both ends, reticulately veined, glabrous. Seeds 4-8.

Distribution: Arabia, Abyssinia.—Very likely introduced in India.

The plant is used in rheumatism and flatulence.

In Indo China, the bark is considered a good febrifuge and is much appreciated as an antiperiodic.

Bombay: Vayni—; *Canarese:* Kempukenjiga, Nirangi, Sunkesari—; *English:* Tiger Bean—; *Indo China:* Flamboyant, Diep tay, Ka ngok, Xoan tay—; *Marathi:* Sankasura—; *Tamil:* Perungondrai, Vadanarayanan, Varatti—; *Telugu:* Chinnaseribiseri, Chittikeshwaramu, Sunkevaramu, Vatanarayana—; *Uriya:* Simamondaro—.

WAGATEA Dalz.

A climbing shrub armed with scattered prickles. Leaves abruptly 2-pinnate; stipules inconspicuous. Flowers subsessile, in long simple or panicled spicate racemes. Calyx-tube campanulate; calyx-segments about as long as the tube, slightly imbricate, the lower concave, slightly larger than the others. Petals 5, subequal, oblong, erect, imbricate, not spreading in aestivation. Stamens 10, free, slightly declinate; filaments short, pilose at the base; anthers uniform. Ovary subsessile, free; ovules many; style slightly clavate at the apex; stigma oblique. Pod ligulate-oblong, indehiscent, few-seeded, subtorulose, with thickened sutures (not winged).—Species 1.—Western Peninsula of India.

1. **Wagatea spicata** Dalz. in Kew Journ. Bot. III (1851) 89. —PLATE 349.

A robust woody climber; branches armed with numerous recurved prickles. Leaves 2-pinnate, 23-30 cm. long; main rhachis armed with recurved prickles; pinnae 4-6 pairs, 7.5-12.5 cm. long, the rhachis terete, puberulous. Leaflets 5-7 pairs, 2.5-4.5 by 1.3-2.2 cm., coriaceous, oblong, obtuse or subacute, dark green, glabrous and shining above, paler beneath, base rounded or cordate; petiolules very short. Flowers nearly sessile, in dense spicate racemes sometimes reaching 60 cm. long; rhachis stout, more or less grooved, clothed with soft brown pubescence, often armed with recurved prickles. Calyx densely puberulous, 1.1-1.3 cm. long, scarlet; segments oblong or subspathulate, obtuse, equalling the campanulate tube. Petals 1-1.3 cm. long, inserted on the top of the calyx-tube,

obovate-spathulate, reticulately veined, dark orange. Stamens equalling the petals, alternately long and short; filaments flattened and densely pilose at the base. Ovary densely pubescent; ovules 4-6; style as long as the filaments and the petals; stigma 2-lobed, oblique. Pods 3.8-6.3 by 1.3-1.6 cm., linear-oblong, swollen above the seeds and constricted between them, and with thickened sutures. Seeds 3-4, obovate-oblong, transverse; testa hard, thick, bony.

Distribution: Hills of the Western Peninsula.

The roots are given in pneumonia.

The bark is used as an application for skin diseases.

Bombay: Wagati, Wakiry—; *Canarese:* Gajjigaballi, Hooliganji, Wagati—; *Konkani:* Vagati—; *Marathi:* Kuldgajga, Wagati, Wakeri—; *Tamil:* Okkadikkodi, Pulinakkagondai—.

Cassia Linn.

Trees, shrubs, or herbs. Leaves abruptly pinnate; rhachis often furnished with glands either between the leaflets or on the petiole below them; stipules various. Flowers usually yellow, in axillary or terminal racemes or in terminal panicles, or subsolitary axillary; bracts and bracteoles various. Calyx deeply divided; tube very short; segments 5, imbricate. Petals 5, imbricate, subequal or the lower the largest. Stamens normally 10, all perfect and subequal or the upper the smaller, or 3-5 imperfect or altogether absent; anthers uniform or those of the lower stamens the larger, dehiscing by terminal pores or by a short slit. Ovary sessile or stalked, free, at the bottom of the calyx; ovules many; style short or elongate; stigma terminal. Pod variable, terete or flat, usually septate between the seeds, dehiscent or indehiscent. Seeds transverse (rarely longitudinal), horizontally or vertically compressed, albuminous.—Species 400.—Tropical and warm temperate regions.

A. Pod 30-60 cm. long, terete .... 1. *C. fistula.*
B. Pods less than 30 cm. long, more or less flattened
  I. Fertile stamens 7, the others reduced to staminodes
  a. Gland of the leaf-rhachis solitary, inserted beneath, not between, the leaflets
    1. Leaflets 3-5 pairs .... 2. *C. occidentalis.*
    2. Leaflets 6-10 pairs. Gland conspicuous, conical ..... 3. *C. sophera.*

b. Glands inserted between 1 or more pairs of leaflets
1. Leaflets 3 pairs
* Gland between each of the 2 lowest pairs of leaflets.
Plant foetid .... 14. *C. tora.*
** Gland between the lowest pair of leaflets only.
Plant not foetid .... 4. *C. obtusifolia.*
2. Leaflets 8-12 pairs .... 5. *C. auriculata.*
c. Glands of the leaf-rhachis absent
1. Leaflets 8-12 .... 6. *C. obovata.*
2. Leaflets 10-16 .... 12. *C. angustifolia.*
3. Leaflets 16-28 .... 7. *C. alata.*
II. Fertile stamens 10
a. Pod cylindric .... 13. *C. javanica.*
b. Pod flat .... 8. *C. glauca.*
c. Leaflets 60-100 .... 10. *C. mimosoides.*
III. Fertile stamens 5. Staminodes absent
a. Leaflets 2 pairs .... 9. *C. absus.*
b. Leaflets 10-20 pairs .... 11. *C. pumila.*

Widely used for their acid, mucilaginous, and cathartic properties.

The following species are used medicinally in China—*C. fistula* Linn., *C. tora* Linn.—; in Indo China—*C. alata* Linn., *C. auriculata* Linn., *C. fistula* Linn., *C. glauca* Lam., *C. pumila* Lam., *C. sophera* Linn., *C. timoriensis* DC., *C. tora* Linn.—; in the Philippine Islands—*C. alata* Linn., *C. fistula* Linn., *C. occidentalis* Linn., *C. sophera* Linn.—; in North America—*C. fistula* Linn., *C. marilandica* Linn.—; in Mexico and Central America—*C. occidentalis* Linn.—; in South America—*C. occidentalis* Linn.—; in Brazil—*C. alata* Linn., *C. cathartica* Mart., *C. fistula* Linn., *C. grandis* Linn. fil., *C. laevigata* Willd., *C. multijuga* Rich., *C. occidentalis* Linn., *C. quinquangulata* Rich., *C. rugosa* Don., *C. sclerocarpa* Vogel, *C. sericea* Sw., *C. splendida* Vogel—; in Guiana—*C. fistula* Linn., *C. grandis* Linn. fil., *C. javanica* Aublet—; in the West Indies—*C. alata* Linn., C. *grandis* Linn. fil., *C. occidentalis* Linn.—; in Guadeloupe—*C. glauca* Lam.—; in Gambia—*C. occidentalis* Linn., *C. sieberiana* DC.—; in French Guinea—*C. alata* Linn., *C. nigricans* Vahl., *C. obovata* Coll., *C. occidentalis* Linn., *C. podocarpa* Guill. & Perr., *C. sieberiana* DC.—; in the Gold Coast—*C. absus* Linn., *C. alata* Linn., *C. fistula* Linn., *C. laevigata* Willd., *C. mimosoides* Linn., *C. occidentalis* Linn., *C. podocarpa* Guill. & Perr., *C. sieberiana* DC.—; in Nigeria—*C.*

goratensis Fres., *C. occidentalis* Linn., *C. tora* Linn.—; in Tropical Africa—*C. absus* Linn.—; in West Africa—*C. obovata* Coll., *C. occidentalis* Linn., *C. sieberiana* DC.—; in South Africa—*C. abbreviata* Oliv., *C. fistula* Linn., *C. mimosoides* Linn., *C. obovata* Collad., *C. occidentalis* Linn., *C. petersiana* Bolle— in East Africa —*C. bearensis* Miq.—; in La Reunion and Madagascar—*C. occidentalis* Linn., *C. Tora* Linn.—; in Ethiopia and Nubia—*C. aethopica* Guib.—; in Egypt—*C. auriculata* Linn., *C. fistula* Linn., *C. lanceolata* Forsk., *C. obovata* Coll.—; in Arabia and Syria—*C. obovata* Coll., *C. sophera* Linn.—; in Europe—*C. obovata* Coll.

OFFICIAL:—*C. acutifolia* Delile: the leaflets (Germany, Italy, Japan, Norway, Portugal, Russia, Spain, Turkey); the fruits (Austria, Denmark, Switzerland); the leaflets and the fruits (Belgium, France, Great Britain, Sweden).

C. angustifolia Vahl: the leaflets (Austria, Belgium, Denmark, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States); the leaflets and the fruits (France, Great Britain); the fruit of *C. angustifolia* Vahl. var. β. *Royleana* Bischoff (Switzerland); the leaflets of *C. elongata* Lemaire—*C. angustifolia* Vahl. (Portugal).

The fruit of *C. Fistula* Linn. (Austria, Great Britain, Italy); *C. Fistula* Linn.—*Cathartocarpus Fistula* Pers. (Portugal).

C. obovata Collad.: the leaflets (Italy, Portugal, Spain); the leaflets and the fruits (France).

The leaflets of *C. Senna* Linn. (Portugal, United States).

1. **Cassia fistula** Linn. Sp. Pl. (1753) 377.—*C. rhombifolia* Roxb. Hort. Beng. (1814) 31; Wight Ic. t. 269.—PLATE 350.

A tree 6-9 m. high; trunk straight; bark smooth and pale grey when young, rough and dark brown when old; branches spreading, slender. Leaves 23-40 cm. long; main rhachis pubescent; stipules minute, linear-oblong, obtuse, pubescent. Leaflets 4-8 pairs, ovate or ovate-oblong, acute, 5-12.5 by 3.8-9.5 cm., bright green and glabrous above, paler and silvery-pubescent beneath when young, the midrib densely pubescent on the under side, base cuneate; main nerves numerous, close, conspicuous beneath; petiolules 6-10 mm.

long, pubescent or glabrous. Flowers in lax racemes 30-50 cm. long; pedicels 3.8-5.7 cm. long, slender, pubescent or glabrous. Calyx 1 cm. long, divided to the base, pubescent; segments oblong, obtuse. Corolla 3.8 cm. across, yellow; petals 5, subequal, obovate, shortly clawed, veined. Stamens all antheriferous, the 3 lowest the longest with very long curved filaments and oblong anthers dehiscing longitudinally, the 4 lateral with short straight filaments and versatile anthers opening by pores at the base, the remaining 3 much smaller, erect with indehiscent anthers. Pods 30-60 cm. long, 2-2.5 cm. diam., pendulous, cylindric, nearly straight, smooth, shining, brown-black, not torulose, indehiscent, with numerous (40-100) horizontal seeds immersed in a dark coloured sweetish pulp, and completely separated by transverse dissepiments. Seeds broadly ovate, 8 mm. long, slightly less in breadth, and 5 mm. thick.

Distribution: Throughout India, Ceylon.—Malaya, China.

The root is useful in skin diseases, leprosy, tuberculous glands, syphilis; cures burning sensation.—The leaves are laxative, antiperiodic; heal ulcers; used in rheumatism; juice given in erysipelas. —The buds improve taste; laxative, antipyretic; cure "kapha", biliousness, skin diseases, leprosy.—The flowers have flavour, with a bitter acrid taste; cooling, astringent; cure "kapha" and biliousness; cause flatulence.—The fruit has flavour; digestible, cooling, purgative, antipyretic; cures leprosy, diseases of the heart, and abdominal pains.—The seeds are sweetish, oily, laxative, carminative; improve the appetite; cure biliousness (Ayurveda).

The leaves lessen inflammation.—The flowers are purgative.—The fruit has a sweetish bad taste with flavour; antipyretic, purgative, abortifacient, demulcent; lessens inflammation and heat of the body; useful in chest complaints, throat troubles, liver complaints, diseases of the eye, griping, rheumatism; may cause asthma.—The seeds are emetic (Yunani).

The root is generally given as a tonic and febrifuge. It has been found to act as a strong purgative.

In the Konkan, the juice of the young leaves is used to cure

ringworm and to allay the irritation caused by the application of the marking-nut juice.

A poultice made of the leaves is said to relieve the chilblains which are common in Upper Sind. It has been beneficially used in facial paralysis and rheumatism when rubbed into the affected parts. Internally, it is given as a derivative in paralysis and brain affections.

Among the Mundas of Chota Nagpur the bean, ground and mixed with water, is taken as a purge. This purge can be stopped by a handful of baked leaves of this same tree; but these leaves act themselves as a purge when the beans have not been taken previously (Encyclopoedia Mundarica).

At Kotra, in Kachhi the fruit is used as a purgative, at Nasirabad, the seeds (Hughes-Buller).

In Cambodia, the bark and the wood are given in dysentery.

In the Gold Coast, the black pulp surrounding each seed is considered a safe and useful purgative.

The plant is used by natives in Rhodesia as a remedy for malaria, blackwater fever, blood-poisoning, anthrax, and dysenteries.

A confection made up of the pulp (free from the seeds) with equal quantity of sugar was administered in doses of 2 to 4 drachms to adults and was found to possess satisfactory action as a purgative. It did not cause any irritation or discomfort to the patients (Koman).

Every part of the plant is prescribed in combination with other drugs for the treatment of snake-bite (Charaka, Sushruta, Yogaratnakara) and scorpion-sting (Charaka, Sushruta, Chakradatta).

Every part of the plant is equally useless in the treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Maurin (*Bull. Sci. Pharmacol.;* 1922, 1917) has isolated oxymethylanthraquinone from the fruit and the bark of the twigs.

Arabic: Kathaulhind, Khiyarshambur—; *Assam:* Sonaru, Sunaru—; *Baigas:* Raella—; *Bengal:* Amultas, Bandarlati, Sonali, Sonalu—; *Burma:* Gnookye, Gnooshway, Ngu—; *Cachar:* Bandolat—; *Cambodia:* Reach chhpus—; *Canarese:* Aragina, Aragvadha, Arevata, Kakkai, Kakke, Konde, Rajataru—; *Central*

Provinces: Hirojah, Jaggarwah, Karkacha, Raila—; *Ceylon:* Kavani, Tiaukkontai—; *Chinese:* A Po Le, Koui Hoa Ts'in, Tch'ang Ko Chou—; *Deccan:* Amaltas, Girmalah—; *Dhera Dun:* Kirala—; *English:* Cassia, Drumstick, Golden Shower, Indian Laburnum, Pudding-pipe, Pudding-stick, Purging Cassia—; *French:* Canéfice, Canéficier, Canificier, Casse officinale, Cassier—; *Garhwal:* Simara, Sinara—; *Garo:* Sonalu—; *German:* Cassienroehrlein, Rohrkassie, Wurstroehrenbaum—; *Gond:* Jaggra, Jugarua, Kambar, Rera—; *Greek:* Glykokalamon, Kassia melaina, Melaina Kassia, Syrinx—; *Gujarat:* Balla, Garmala, Garmalo, Girmala—; *Hindi:* Amaltas, Bandarlauri, Girmalah—; *Indo China:* Bo cap muoc, Brai xiem, Krete, Sach phle—; *Italian:* Cassia—; *Kharwar:* Dunras—; *Khond:* Pundali—; *Kolami:* Hari—; *Konkani:* Baio, Ballo, Bavo—; *Kotra:* Chuntur—; *Kumaon:* Amaltas, Kitola, Rajbriksh—; *Kurku:* Banag, Bangru—; *Lambadi:* Ramdanda—; *Malaya:* Sonawir—; *Malayalam:* Konna, Kritamalam, Saturangulam, Svarnnakam, Svarnaviram—; *Marathi:* Bahava, Bawa, Bhawabaya, Boya, Chimkani, Garmala, Girimala—; *Mexican:* Cuauhnacaztli, Honxin—; *Mundari:* Haridaru—; *Nasirabad:* Chhamkani, Chimkani—; *Nepal:* Bandarlata, Rajbriksha—; *North-Western Provinces:* Itola, Kitoli, Kitwali, Shimarra, Sim—; *Oudh:* Warga—; *Palamow:* Bonurlati, Bonurlauri—; *Persian:* Khiyarchanbar, Khiyarechiga—; *Porebunder:* Garmalo—; *Portuguese:* Canna fistula, Cassia fistula—; *Punjab:* Alash, Ali, Kaniar, Karangal, Kiar—; *Reddi:* Rela—; *Sanskrit:* Amaha, Antadru, Aragvadha, Arevata, Arogyashimbi, Aruja, Chakraparivyadha, Chaturangula, Dirghaphala, Drumotpala, Himapushpa, Jatharanut, Jvarantaka, Kandughna, Karnabharanaka, Kritamala, Kritamalaka, Kundali, Kushtaghna, Kushthasudana, Mahakarnikara, Maharajdruma, Manthana, Naktamala, Nripadruma, Pramcha, Rajataru, Rajavriksha, Rechana, Rochana, Samyak, Saraphala, Shamyaka, Shephalika, Suvarnaka, Svarnabhushana, Svarnadra, Svarnanga, Svarnasthali, Svarnavriksha, Vyadivata, Vyathantaka—; *Santal:* Nuruic—; *Saora:* Rella, Sonnalu—; *Sind:* Chimkani—; *Sinhalese:* Ahalla, Ahilla, Ehela—; *Spanish:* Canafistola, Cana fistula—; *Tagalog:* Ancherhan,

Canapistola, Quinapestula—; *Tamil:* Appai, Ar, Aragoram, Arakkuvadam, Isandar, Idali, Iragavinnadagam, Iragaviruttam, Irali, Iyagam, Iyyusaviyam, Kadukai, Konrai, Madalai, Sarak-kondai—; *Telugu:* Aragvadhamu, Kolaponna, Rela, Sampakamu, Suvarnamu—; *Tulu:* Konde—; *Urdu:* Amaltas—; *Uriya:* Soturongulo, Sunari—; *Visyan:* Balay, Balayong, Baloyong, Ibabao, Lombayong—.

2. **Cassia occidentalis** Linn. Sp. Pl. (1753) 377.—*Senna occidentalis* Roxb. Fl. Ind. II (1832) 343.—PLATE 351.

A diffuse (usually annual) undershrub 0.6-1.5 m. high; branches subglabrous, furrowed, often purplish. Leaves very fetid when bruised, 15-20 cm. long; rhachis glabrous, with a single sessile gland near its base. Leaflets 3-5 pairs, 2.5-10 by 1.3-3.8 cm., membranous, glaucous, ovate-lanceolate, gradually attenuated to a very acute apex, glabrous above, glabrous or finely pubescent beneath, base usually rounded and somewhat oblique; petiolules very short. Flowers in short-peduncled few-flowered racemes, corymbose, axillary and forming a terminal panicle; pedicels spreading, 5 mm. long, elongating to 1.3 cm. in fruit; bracts 1.3 cm. long, ovate, acuminate, caducous, white with a pink tinge. Calyx 1 cm. long, divided to the base, glabrous; segments white, slightly tinged with pink, oblong, obtuse, membranous. Petals 5, subequal, 1.3 cm. long, ovate-oblong, obtuse, yellow, faintly veined with orange. Stamens 10, of which the three upper are reduced to staminodes, the anthers of the remaining 7 perfect, the 3 lower longer and with larger anthers than the 4 lateral ones. Pods 10-12.5 and about 5 mm. thick, recurved, glabrous, compressed, transversely septate, distinctly torulose. Seeds 20-30, ovoid, compressed at one end and rounded at the other, 6 mm. long by 4 mm. broad, hard, smooth, shining, dark olive-green.

Distribution: Throughout India and the tropics generally.

The root is useful in ringworm, elephantiasis, and scorpion-sting.—The leaves are tasty; aphrodisiac, alexeteric; cure cough, hiccough, asthma, "kapha" and "vata"; sweetish, bitter, stomachic; cure "tridosha" fevers; good for sore throat and biliousness (Ayurveda).

The root is a cure for snake-bite; the juice when fresh is useful in ringworm; heals wounds; cures ascites.—The fruit is a cure for scorpion-sting.—The seeds are bitter; they are used in heat of the blood, for winter cough and for cough in animals (Yunani).

The whole plant is purgative, tonic, and febrifuge. The seeds and leaves are used externally in cutaneous diseases.

In the Konkan, the seeds are used as a cure for the convulsions of children.

At Kotra, in Kachhi the plant is considered a cure for sore eyes (Hughes-Buller).

The diuretic properties of the root are recognized not only in India but also in Tahiti, Martinique, Guadeloupe, Senegal, Nossi-Be, La Reunion.

In La Reunion, the root is considered bitter, tonic, and stomachic; the leaves, depurant and febrifuge; the seeds, tonic, and febrifuge.

In Madagascar, the whole plant is considered febrifuge. The root is mostly used as a diuretic. The plant enters into the composition of numerous ointments prescribed in skin diseases.

In the West Indies, the root is considered diuretic and the leaves taken internally and applied externally are given in cases of itch and other cutaneous diseases. The root is said by Martius to be beneficial in obstructions of the stomach and in incipient dropsy.

In Brazil, an infusion of the root-bark is used as a tonic and diuretic.

This plant is regarded as a panacea by the Mandingo people of the Gambia. The warm baths, which are given for all disorders, have a quantity of the leaves thrown into them. They are said to be a reliable remedy for the cure of rheumatism: and in all fever cases the bodies of the patients are rubbed with them.

In Guinea, every part of the plant is considered tonic and febrifuge. The fresh leaves are ground and applied to wounds and swellings; boiled they are used in lotion or fumigation. The roasted seed is an excellent diuretic.

A hot decoction of the leaves is given as an antiperiodic in Dahomey and is preferred to quinine on account of its tonic properties.

The plant is much used in native medicines of the Gold Coast.

—1(a) The roots are dug up, and the bark removed. They are then washed and pounded and mixed with black pepper, put in a cloth, and the juice squeezed into the nose to cure headache. (b) The bark of the roots is used as quinine to cure fever.—2(a) As a cure for guinea worm, the leaves are pounded with salt and onions and applied to the affected parts. The treatment is said to bring the worm out quickly, and is believed to be a complete cure. (b) The leaves are used to cure stomach trouble and fever in children, and are also squeezed in the eyes of old men and children to cure eye complaints. (c) The leaves are boiled and the liquor drunk by children to cure worms.—(3) The seeds are sometimes roasted and ground and used as a blood tonic.

A decoction of the powdered seeds 1 in 10 was given in doses of ½ to 2 ounces to cases of constipation and found to act as a mild purgative (Koman).

American Indians use the root as an antidote against various poisons. In India, the fresh root is administered internally with black pepper to counteract the effect of snake-venom.

The root is not an antidote to snake-venom (Mhaskar and Caius).

The antiperiodic value of the leaves and seeds is now admitted by every therapeutist who has used them. On the other hand, chemical analysis has failed to show the presence of either glucosides or alkaloids; and the so-called active principle remains unknown (Haeckel).

Maurin (*Bull. Sci. Pharmacol.;* 1922, 1927) has isolated oxymethylanthraquinone from the root, the leaf, and the fruit.

Antsianaka: Bemaimbo—; *Aowin:* Ekyaindaluwa—; *Ashanti:* Anansedua—; *Bengal:* Kalkashunda—; *Betsileo:* Voantsiraokonangatra—; *Bombay:* Hikal—; *Brazil:* Lavapratos, Mamanga, Mangerioba, Pajomarioba—; *Burma:* Kalan, Maizali, Mezali—; *Canarese:* Anesogate, Doddatagase, Elevure, Kolutagase, Uresogate—; *Ceylon:* Ponnantakarai—; *Dahomey:* Ahuandeme—; *Deccan:* Barikasondi, Kasondi, Kasunda—; *English:* Fetid Cassia, Negro Coffee, Rubbish Cassia, Stinking Weed—; *Ewe:* Agorbladzo, Devidevikpelimumu, Dzonggbaleng, Dzovi—; *French:* Arbre à l'ail, Bois puant, Café nĕgre, Casse fétide, Casse puante, Herbe puante—; *Fulah:* Tigasowrou—;

Ga: Bansa, Gbekengbiiamadang—; *Gujerati:* Kasodari, Kasundari—; *Hausa:* Raidore—; *Hindi:* Barikasondi, Chakunda, Kasonda, Kasondi, Kasunda—; *Hova:* Tsorokanangatra, Voanembanalika, Vonjary—; *Indo China:* Phak ngot—; *Katagum:* Bazanfase—; *Kotra:* Chashen, Chawar—; *La Reunion:* Gros indigo ā fleurs jaunes, Gros indigo sauvage, Souveraine—; *Madagascar:* Saringvazo—; *Malay:* Kachang Kota, Kutepeng hutan—; *Malayalam:* Karintakara, Mattantakara, Peyaviram, Ponnaviram—; *Malinke:* Bentamare—; *Mandingo:* Bantamara—; *Marathi:* Kasoda, Rankasvinda—; *Mundari:* Marangcakonda—; *Nasirabad:* Howar—; *Nzima:* Kedeberuba—; *Panch Mahals:* Sundarasen—; *Peki:* Agorbladzo—; *Porebunder:* Kasundri—; *Portuguese:* Fedegosa—; *Sakalave:* Kintsakintsana, Manakontsovaka—; *Sanskrit:* Arimarda, Dipana, Kala, Kalankata, Kanaka, Karkasha, Kasamarda, Kasamardaka, Kasari, Kashamarda, Jarana, Vimarda—; *Senegal:* Bentamare—; *Sinhalese:* Penitora—; *Sokoto:* Sangasanga—; *Tagalog:* Balatongoso, Balotangaso, Tighiman—; *Tamil:* Nattandagarai, Peyavirai, Ponnavirai—; *Telugu:* Kasinda, Peddakasinda—; *Timbuctoo:* Bentamare—; *Tulu:* Anatajanku—; *Twi:* Mmofra brorde—; *Urdu:* Kasonji—; *Uriya:* Kasundri—; *Visayan:* Tambalisa—; *Zulu:* isiNyembane, umNgandanyoka—.

3. **Cassia sophera** Linn. Sp. Pl. (1753) 379.—*Senna sophera* Roxb. Fl. Ind. II (1832) 347.—PLATE 352.

A shrub or undershrub 2.4-3 m. high, annual or perennial. Leaves 18-23 cm. long; rhachis grooved, glabrous or nearly so, with a solitary conical gland near the base. Leaflets 6-10 pairs, 3.8-6.3 by 1.3-2 cm., opposite, membranous, glaucous, lanceolate, acute or acuminate, glabrous, base usually rounded; main nerves 10-12 pairs; petiolules 1.5-2 mm. long, glabrous. Flowers in axillary, short, few-flowered, corymbose racemes; pedicels 6 mm. (in fruit reaching 1.3 cm.) long, pubescent; bracts 4 mm. long, green, ovate, acute, caducous. Calyx 6 mm. long, divided to the base; segments membranous, obtuse, green. Petals 5, subequal, 1.3 cm. long, ovate, obtuse, yellow. Stamens 10 of which the 3 upper are reduced to staminodes, the remaining 7 usually perfect, the 3 lower longer and

with larger anthers than the 4 lateral ones, of which one is sometimes reduced to a staminode. Pods 7.5-10 by 1 cm. and about 5 mm. thick, slightly recurved, somewhat turgid, septate between the seeds, not or scarcely torulose. Seeds 30-40, broadly ovoid, acute, compressed, dark brown, 6 by 4 mm.

Distribution: Throughout India and in most tropical countries.

In both Ayurveda and Yunani the plant is credited with the same properties as *C. occidentalis.*

It is considered to have expectorant properties.

The bark in the form of infusion and the powdered seeds, mixed with honey, are given in diabetes.

The bark, leaves, and seeds are used as a cathartic, and the juice of the leaves is viewed as a specific in ringworm, especially when made into a plaster in combination with sandal-wood. A paste made from the root is sometimes used instead of the juice of the leaves. The powdered seed is used for the same purpose and also for itch.

In Madras, the infusion of the leaves is taken internally for gonorrhœa in its sub-acute stages, and it is also used externally for syphilis.

In Tongking and Laos, the plant is used as an expectorant.

A decoction of the whole plant is said to be useful in diminishing urine, and also to act as an expectorant. This decoction was administered to cases of acute bronchitis and was found to give relief (Koman).

The root is administered internally with black pepper for snake-bite.

For scorpion-sting the juice of the root (Vrindamadhava) or of the leaf (Yogaratnakara, Bhaishajyaratnavalli, Chakradatta) is put into the ear.

Whether it be in the treatment of snake-bite (Mhaskar and Caius) or of scorpion-sting (Caius and Mhaskar) the roots and leaves are equally useless.

Bangalore: Kulkashinda—; *Bengal:* Kalkashunda—; *Canarese:* Kasamarda—; *Ceylon:* Takarai—; *Chinese:* Kiue Min—; *Deccan:*

Janglitakla, Sarikasondi—; *Gujerati:* Kasundari, Kuwadice—; *Hindi:* Banar, Baskikasondi, Kasondi, Kasunda, Kasundi—; *Indo China:* Thao quyet minh, Xy tau—; *Malay:* Cambang lunning—; *Malayalam:* Pounantakara—; *Marathi:* Kasodi, Rantankala—; *Mundari:* Marangcakonda—; *Peking:* Ouang Kiang Lan—; *Porebunder:* Kasundri—; *Sanskrit:* Kasamarda, Kasaripu, Suvarnamayahari, Talapota—; *Sinhalese:* Urutora—; *Tamil:* Ponnavirai, Nalal, Peravirai, Periyadagarai, Sularai—; *Telugu:* Kasamardakamu, Kondakashinda, Nutikasinda, Paiditangedu, Tagara—; *Urdu:* Kalakasonji—; *Uriya:* Kasundri, Kolakasunda—.

4. **Cassia obtusifolia** Linn. Sp. Pl. (1753) 377.—*Senna toroides* Roxb. Fl. Ind. II (1832) 340.

An annual herb 0.6-2 m. high, not fetid. Leaves 7.5-10 cm. long; rhachis grooved, more or less pubescent, with a conical gland between the lowest pair of leaflets only; stipules 1.3-2 cm. long, linear-subulate, caducous. Leaflets 3 pairs, opposite, 2.5-4.5 by 1.3-2 cm. (the lowest pair the smallest), obovate-oblong, green, membranous, glabrous or more or less pubescent, base somewhat oblique, usually rounded; main nerves 8-10 pairs; petiolules 2.5 mm. long, pubescent. Flowers usually in subsessile pairs in the axils of the leaves, the upper crowded; common peduncle in fruit not exceeding 4 mm. long; pedicels in flower 2.5-3.2 cm. long. Calyx glabrous, divided to the base; segments 6 mm. long, ovate, acute, spreading. Petals 5, bright yellow, subequal, 1.3-0.8 cm., oblong, obtuse, the upper petal (standard) truncate. Stamens 10, the 3 upper reduced to minute staminodes, the remaining 7 perfect, subequal. Pods 20-25 by 0.5 cm., subterete, obliquely septate, glabrous, transversely reticulate, the sutures broad. Seeds 30-35, rhombohedral, 5 mm. long.

Distribution: Tropical America; has become more or less naturalized in India.

The root is useful for skin diseases, tuburculous glands, and ringworm.—The leaves are bitter with a sharp taste and some flavour; hot, dry; digestible, refrigerant, anthelmintic, antipyretic, laxative, diuretic; cure biliousness, bronchitis, asthma, leprosy, skin diseases, piles, itching, head troubles, " tridosha ", urinary discharges; useful

in diseases of the heart and in ringworm.—The fruit and seeds are alexiteric, alterative, anthelmintic, astringent to the bowels; cure tumours, leprosy, skin diseases, scabies, cough, asthma, burning sensation, hemicrania (Ayurveda).

The leaves are laxative; useful in indolent ulcers, leprosy, skin diseases.—The seeds are demulcent and maturant; useful in itch, ulcers, ringworm, skin diseases (Yunani).

The leaves are gently aperient; fried in castor oil, they are considered a good application to foul ulcers. The seeds ground with sour butter-milk are used to ease the irritation of itchy eruptions; and the root, rubbed on a stone with lime juice, is supposed to be one of the best remedies for ringworm. The leaves are also used as a poultice to hasten suppuration. A warm remedy in gout, sciatica and pains in the joints.

In Indo China, the pods are used in dysentery and ophthalmia.

In the Malay Peninsula, the seeds are used internally and externally for all sorts of eye diseases; preparations of the seeds are also given for liver complaints and boils.

In Madagascar and La Reunion, the plant is considered aperient, antihysteric, antidartrous, and febrifuge.

An oil named "chakramardha" whose chief ingredients are *C. obtusifolia* and *Eclipta alba* was used in cases of ringworm as an external application and found to be very beneficial (Koman).

Charaka recommends the fruit in snake-bite, the bark and the roots in scorpion-sting.

The fruit is useless in the treatment of snake-bite (Mhaskar and Caius); the roots and bark are equally useless for scorpion-sting (Caius and Mhaskar).

A preliminary chemical examination of the seeds has been carried out by Jois and Manjunath (*Journ. Ind. Chem. Soc.;* VII, 1930).

Annam: Dau muong, Quyet minh—; *Arabic:* Sanjisboyah, Sanjsaboyah—; *Bengal:* Chakunda, Panevar—; *Betsileo:* Voamahatsara, Voatelondolo—; *Bombay:* Kovariya, Kowaria, Tankala—; *Burma:* Dangwe, Kujne—; *Canarese:* Gandutagase, Sagace, Sogase, Sogata, Tagace, Taragasi, Vanavarike—; *Chinese:* Chueh Ming, Ts'ao Chueh—; *Deccan:* Tarota—; *English:* Fetid Cassia, Ringworm

Plant—; *Gujarat:* Kovariya, Kawario—; *Hausa:* Tafasa—; *Hindi:* Chakunda, Panevar—; *Hova:* Tsiaridrafinamboa, Tsiaridrafy—; *Indo China:* Dau giau, Dau ma, Lac gioi, Nia leung meun, Quyet minh, Thao kit tam—; *Konkani:* Taikillo, Taiquilo—; *Lambadi:* Pambadiar—; *Madagascar:* Petite casse puante—; *Malay:* Gelenggang kechil, Gelenggang padang—; *Malaya:* Chow keat—; *Malayalam:* Sakramardakam, Takara—; *Marathi:* Takala, Takla, Tankli, Tarota—; *Mundari:* Cakonda, Cakonra, Cakonta, Huringcakonda—; *North-Western Provinces:* Panwar—; *Persian:* Sangsaboyah—; *Punjab:* Chakunda, Panwar, Pawar—; *Sadani:* Cakor—; *Sanskrit:* Avudham, Chakragaja, Chakramarda, Chakramardaka, Chakrapadmada, Chakravha, Chakri, Dadrughna, Dridhabija, Edagaja, Edahasti, Gajakhya, Kharjjughna, Kusuma, Meshakshi, Meshalochana, Meshavhaya, Padmata, Prabhunatha, Prapunnala, Prapunnata, Prisnaparni, Punnata, Sakramardaka, Shukanashana, Taga, Tarkila, Tarkina, Tarvata, Uranakhyaka, Uranaksha, Vimardaka, Vyavartaka—; *Santal:* Chakaodaarak—; *Sinhalese:* Petitora—; *South Africa:* Mwango, Swahili—; *Tagalog:* Balatongaso, Catanda, Catandagaso, Manimanihan, Mongonongohan—; *Tamil:* Senavu, Sirudagarai, Tagarai, Vanamavaram, Vindu—; *Telugu:* Tagirise, Tantemu, Tantiyamu—; *Tulu:* Tajanku—; *Twi:* Mmorfa brorde—; *Uraon:* Cakonda, Cakora—; *Urdu:* Panwar—; *Uriya:* Chakunda—; *Visayan:* Bahobaho—.

5. **Cassia auriculata** Linn. Sp. Pl. (1753) 379.—*Senna auriculata* Roxb. Fl. Ind. II (1832) 349.—Plate 354B.

A tall much-branched shrub; bark smooth, reddish brown; branchlets finely pubescent. Leaves 7.5-10 cm. long; rhachis densely fulvous-pubescent with an erect linear gland between each pair of leaflets; stipules foliaceous, reflexed, very large, rotundate-reniform, produced at the base on the side next the petiole into a long subulate point, persistent. Leaflets 8-12 pairs, 2-2.5 by 1-1.3 cm., slightly overlapping, oblong-obovate, obtuse or emarginate, mucronate, glabrous or finely downy, dull green above, paler beneath, base usually rounded; petiolules 1.25 mm. long. Flowers large, reaching 5 cm. across, in terminal and axillary corymbose racemes; pedicels

2-2.5 cm. long; bracts ovate, acuminate, caducous. Calyx glabrous; segments leathery, concave, the 2 outer much smaller than the other 3. Petals with long claws, crisped on the margin, bright yellow, veined with orange. Stamens 10, of which the 3 upper are reduced to staminodes, the remaining 7 perfect, of which the 3 lower are larger than the 4 lateral ones. Pods 7.5-12.5 by 1.3-1.6 cm., flat, thin, papery, oblong, obtuse, mucronate, pale brown, deeply depressed between the seeds, having a crumpled appearance, transversely veined, pubescent. Seeds 10-20.

Distribution: Dry regions of the Central Provinces and the W. Peninsula, Rajputana Desert.

The root is alexeteric; useful in thirst, urinary discharges; cures tumours, skin diseases, asthma; causes flatulence.—The leaves are anthelmintic; good for ulcers, leprosy, skin diseases.—The flowers are used in urinary discharges, nocturnal emissions, diabetes, and throat troubles.—The fruit is anthelmintic; useful in vomiting, thirst, urinary discharges.—The seed is alexipharmic; used in ophthalmia, diabetes, dysentery (Ayurveda).

In Mysore, the bark is considered astringent. The seeds are applied to the eyes in chronic purulent conjunctivitis.

In Ceylon, the bark and root are considered astringent and used as an alterative.

A decoction of the entire plant was given in one ounce doses three times a day in diabetes mellitus without benefit (Koman).

Berar: Tarota—; *Burma:* Peikthingat—; *Canarese:* Avarike, Olletangedi, Sakusina, Tangadi, Tangedi—; *Ceylon:* Matara Tea—; *Chinese:* Kiang Mang, Kiang Mang Kiue Min—; *Cutch:* Awala—; *Deccan:* Tarvar, Tarwar—; *English:* Tanner's Cassia, Tanner's Senna—; *Gujarat:* Aval, Awal—; *Hindi:* Taroda, Tarval, Tarvar, Tarwar—; *Lambadi:* Olaniyaro—; *Malayalam:* Aviram, Ponnaviram—; *Marathi:* Taravada, Taroda, Tarwad—; *Porebunder:* Awar—; *Sanskrit:* Avartaki, Charmaranga, Mayahari, Pitakilaka, Timirihari—; *Sinhalese:* Ranavara—; *Tamil:* Avarai, Avaram, Avirai, Sadurguli, Semmalai, Summai—; *Telugu:* Merakatangedu, Tangedu, Tangera—.

6. **Cassia obovata** (L.) Collad. Hist. Cass. (1816) 92, t. 15A.—*C. obtusa* Roxb. Hort. Beng. (1814) 31; Wight Ic. t. 757.—*C. burmanni* Wight in Madras Journ. VI, t. 5.—PLATE 354A.

A diffuse perennial herb 30-90 cm. high; stems glabrous, pale green, obtusely angular, striate, somewhat woody below; branches spreading, glabrous except the very young parts. Leaves 5-10 cm. long; rhachis glabrous, striate, without glands between the leaflets; petioles 1.3-2 cm. long; stipules 6 mm. long, obliquely lanceolate, very acute. Leaflets 3-6 (rarely 7) pairs, 2-2.5 by 1-1.3 cm., broadly oblong or obovate-oblong, obtuse, mucronate, pale green and glabrous above, glaucous and glabrous or puberulous beneath, base obtuse. Flowers in axillary peduncled racemes which elongate in fruit and are ultimately longer than the leaves; pedicels very short. Calyx 1 cm. long, divided to the base; segments oblong, obtuse, membranous, veined. Petals 1.3 cm. long, obovate-oblong, shortly clawed, yellow, reticulate with darker veins. Perfect stamens 7, very unequal, the 2 or 3 lowest much the largest, the staminodes minute; filaments short. Ovary densely pubescent. Pods 2.5-4.5 by 1.3-2 cm., flat, thin, papery, glabrous, rounded at both ends, much recurved, transversely veined and with a line of prominent longitudinal crests down the middle of the pod over the seeds. The sutures very thin, and the persistent base of the style near the apex of the shorter side of the pod. Seeds 6-12, wedge-shaped, 6 by 8 mm., truncate or retuse at the apex, finely reticulate-rugose, and with a transverse ridge across the middle of each face, dark brown, shining.

Distribution: S. M. Country, Deccan, Gujarat, Sind, Baluchistan, Punjab.—Arabia, Egypt, Abyssinia, Nubia.

One of the principal sources of medicinal senna leaves.

In Guinea, an infusion of the pods or young leaves is given as a purgative.

The Zulus use a milk infusion of the root in influenza and, if the phlegm is obstructive, the powdered root mixed with fat.

Maurin (*Bull. Sci. Pharmacol.;* 1922, 1927) has isolated oxymethylanthraquinone from the leaflets and the pods.

Afrikaans: Elandsertjie—; *Bechuanaland:* Swartstorm—; *Bombay:* Bhuitarwar—; *Canarese:* Nelavare—; *Ceylon:* Nilavakai—; *Egypt:* Senabaharuy, Senabelledy, Senagebely, Senahagazy, Senamekkeh, Senasaydi—; *English:* Alexandria Senna, Country Senna, Italian Senna, Nubian Senna, Officinal Senna, Senegal Senna, Tropoli Senna—; *Gujerati:* Mindiawal, Suratisonamukhi—; *Hausa:* Filasko—; *Hindi:* Chhotataroda—; *Kulanch:* Kaspind—; *Las Bela:* Dhidwal—; *Malayalam:* Seruvanni, Sunnamaki, Vattantakara—; *Marathi:* Bhonyataravad, Mendial—; *Ormara:* Nilthak—; *Pab Hills:* Kuri, Sans—; *Porebunder:* Bhonyaawal—; *Sanskrit:* Bhumyahuli, Bhutalapota—; *South Africa:* Elands Pea, Wild Senna—; *Spanish:* Arbol del Sen—; *Tamil:* Kattunilavirai, Nilavirai, Vellaipponnavirai—; *Telugu:* Nelaponna, Nelatangedu, Sunamukhi—; *Zulu:* imPengu—.

7. **Cassia alata** Linn. Sp. Pl. (1753) 378.—PLATE 355.

A large shrub with very thick finely downy branches. Leaves subsessile, 30-60 cm. long. Leaflets 8-12 pairs, oblong-obtuse, 5-15 cm. long, minutely mucronate, rigidly subcoriaceous, glabrous, or obscurely downy beneath, broadly rounded, oblique at the base. Rhachis narrowly winged on each side of the face. Stipules deltoid, rigid, persistent, articulate, 6 mm. long. Flowers in short pedicels, in spiciform, pedunculate racemes; the buds in yellow caducous bracts. Sepals obtuse; petals bright yellow, with darker veins, broad-ovate, 3.2 cm. long. Stamens very unequal. Perfect stamens 7, the anthers subequal or those of 2-3 lowest larger than the others. 3 posterior filamens without anthers. Pod long, ligulate with a broad wing down the middle of each valve, membranous, dehiscent, straight and glabrous; 10-20 by 1.3-1.6 cm. Seeds 50 or more.

Distribution: Very likely a native of the W. Indies. Introduced into India.

The leaves are sour; cure "vata", itching, cough, asthma, ringworm, skin diseases; vermicide (Ayurveda).

The leaves of this plant are regarded as an excellent medicine for ringworm. They are also used in other skin diseases and considered useful in snake-bites.

Internally, the leaves and flowers are prescribed as a tonic.

The evidence collected is strongly in favour of its efficacy in ringworm. The best way to apply it is to bruise the leaves and mix them with lime juice, the paste thus prepared is spread upon the affected part. The leaves have also purgative properties.

In eczema, I have obtained the best results by washing the parts repeatedly with a strong decoction of the leaves and flowers. The bark has the same properties. In cases of bronchitis and asthma, in herpetic constitutions, I have administered the decoction of the leaves and flowers in repeated doses during the day, relieving dyspnoeal oppression and promoting expectoration. The medicine acts on the bowels slightly and increases the secretion of urine (Dr. Amed; Ph. J., 28-4-88).

In Indo China and the Philippine Islands, the leaves are considered most effective against herpes. The wood in decoction is used as a mild purgative.

In Guinea, the pounded fresh leaves are rubbed on or applied to all kinds of skin affections.

In the Gold Coast, the leaves are crushed mixed with black pepper and applied to dhoby itch, craw-craw, and ringworm on the head or on the skin. The infected place is rubbed until the blood comes, and then the leaves are rubbed in the palms and applied to the sores, which are effectively cured. This is one of the most effective amongst native medicines. When boiled the leaves have a purgative effect. They are also boiled and drunk by women to hasten the delivery of children.

The paste of the leaves was used as an external application in several cases of ringworm of the body and was found to be efficacious in recent cases, but in chronic cases the drug failed to bring about a cure (Koman).

In snake-bite the fresh leaves are given internally. For scorpion-sting any part of the plant is made into a paste and applied to the sting.

The leaves are not an antidote to snake-venom (Mhaskar and Caius). Every part of the plant is equally useless in the treatment of scorpion-sting (Caius and Mhaskar).

Akwapim: Duawusu—; *Ashanti:* Yamnua—; *Bengal:*

Dadmardan, Dadmari—; *Bombay:* Dadamardana—; *Burma:* Maizali-gi, Simbo-maizali, Timbo-mezali—; *Cambodia:* Danghet—; *Canarese:* Doddasagate, Simyagase—; *Deccan:* Datkapatta, Vilayatiyagati—; *English:* Ringworm Shrub, Winged Senna—; *Ewe:* Agbobladzoe—; *French:* Bois puant, Casse ailée, Dartrier, Herbe à dartres—; *Ga:* Asengnti—; *Hindi:* Dadmurdan, Datkapat—; *Indo China:* Dang hoet, Muon trau, Tang het—; *Java:* Daunkurap—; *Krepi:* Duawusu—; *Krobo:* Amlortshi sinongbetsho, Blairfo—; *Malayalam:* Elakajam, Simayakatti—; *Marathi:* Dadamardana—; *Nzima:* Ezinliba—; *Philippines:* Acapulco, Pacagonconcastila—; *Sanskrit:* Dadrughna, Dvipagasti—; *Sinhalese:* Attora—; *Tagalog:* Baiyabasin, Catanda, Sonting, Sunting—; *Tamil:* Anjali, Simaiyagatti, Vandugolli—; *Telugu:* Mettatamara, Simayavisa—; *Tulu:* Daddumardu, Puritappu—; *Twi:* Duawusu, Orsempeng—; *Uriya:* Dadumorddono, Jadumari—; *Visayan:* Casitas, Palochina, Sunting—; *Wassaw:* Semperi—.

8. **Cassia glauca** Lam. Encycl. Méth. I (1784) 647.—Plate 356A.

A small tree; branches numerous, spreading, glabrous. Leaves 12.5-23 cm. long; rhachis pale, puberulous, with a clavate gland between each of the 2-3 lower pairs of leaflets; stipules 8 mm. long, linear, acute, falcately curved, caducous. Leaflets 4-6 pairs, 3.8-7.5 by 2.5-3.8 cm. (the lower pair the smallest), elliptic-oblong, subacute, pale green and glabrous above, glaucous and slightly pubescent or glabrous beneath, base usually rounded; petiolules 3 mm. long, pubescent. Flowers in axillary corymbose racemes shorter than the leaves; pedicels grooved and angled, more or less pubescent; bracts ovate, acuminate, pubescent, reflexed, caducous. Calyx divided to the base, yellow, glabrous, membranous, reticulately veined; segments broadly oblong or suborbicular, the 3 outer smaller than the 2 inner. Petals 2 by 1.6 cm., broadly oblong, obtuse, shortly clawed, yellow. Stamens 10, all perfect, subequal. Pods stalked, 15-20 by 1.3-2 cm., straight, flat, thin, tapering to both ends, marked with raised lines between the seeds, veined, glabrous. Seeds 20-30, oblong, rounded at one end, narrowed at the other, 6 by 3

mm., compressed, smooth, dark brown, shining, with a shallow oblong pit on each of the flat faces.

Distribution: Throughout India.—Tropical Asia and Australia generally, but usually cultivated.

The bark and leaves are prescribed in diabetes and gonorrhœa (Balfour).

In the Guadeloupe, the leaves pounded with sugar and milk are a famous cure for blennorrhagia.

Canarese: Adavitangedi, Betadavare, Teyitte—; *Indo China:* Muong bien, Sen kin—; *Lambadi:* Motovallana—; *Malayalam:* Takara, Valiyatakara, Vellatakara—; *Marathi:* Mothatarvad—; *Sinhalese:* Walahalla—; *Tamil:* Kovalai, Kunduppukkonrai, Pendagarai, Vellarai, Vellaittagarai—; *Telugu:* Kondatantemu, Mettatangedu—.

9. **Cassia absus** Linn. Sp. Pl. (1753) 376.—PLATE 357.

An erect, sparingly branched annual 15-45 cm. high; stems and branches clothed with spreading viscous glandular hairs. Leaves long-petioled; rhachis viscous-hairy, grooved; petioles 2-2.5 cm. long; stipules 3 mm. long, subulate. Leaflets 2 pairs, very oblique, 1.6-3.8 by 0.8-2.5 cm. (the terminal pair the largest), elliptic-oblong or elliptic-obovate, obtuse or subacute, minutely mucronate; glabrous or nearly so above, slightly hairy but not glandular beneath; petiolules 1.25 mm. long, densely hairy. Flowers in terminal or leaf-opposed erect narrow few-flowered racemes; pedicels short, viscous-hairy; bracts beneath the pedicels ovate, acute; bracteole 1 about the middle of each pedicel, small, ovate. Calyx hairy, 4 mm. long; segments oblong, obtuse, subequal. Petals 6 mm. long, obovate-cuneate, reddish yellow, tender, veined. Stamens 5 all perfect, equal. Ovary densely bristly with long hairs. Pods 2.5-4.5 cm. by 6-8 mm., ligulate, nearly straight, oblique, compressed, thin, clothed with bristly hairs. Seeds 4-6, trapezoid-ovoid, 4.5 by 4 mm., black, shining.

Distribution: Throughout India, Ceylon.—Tropical Asia, Australia and Africa.

The leaves are hot, bitter and acrid; astringent to the bowels; cure "vata" and "kapha", tumours, cough, diseases of the nose,

hiccough, asthma; enriches the blood; cholagogue.—The seeds are bitter; cooling, alexipharmic, astringent to the bowels; heal ulcers; good in diseases of the eye, piles; cure bronchitis, pains, itching, hiccough (Ayurveda).

The seeds are bitter; astringent to the bowels, diuretic, attenuant, stimulant; cure diseases of the eye; used in syphilitic ulcers, leucoderma (Yunani).

The seeds are attenuant and astringent. They are used as a collyrium to strengthen the sight; in purulent ophthalmia about a grain of the powdered seeds, after being baked, is introduced beneath the eye-lids.

The receptacle of the seed possesses diuretic and stimulant properties. Used as a cathartic in habitual constipation (dose $1/8$—3 drams). Seeds are found efficacious in ringworm.

In some books a plaster made from the seeds is recommended as an application to wounds and sores, especially of the penis.

In the Gold Coast, the roots are ground with Mako pepper and boiled in water. The liquor is then drunk with palm wine to cure constipation.

Arabic: Chashmizaj, Chichm, Habessoudan, Tashmizaj—; *Bombay:* Chaksie—; *Deccan:* Banar, Chaksu, Chakut—; *Ga:* Korlitsho—; *Gold Coast:* Black Grain—; *Gujarat:* Chimar, Chimed, Chimr, Chinol—; *Hausa:* Fideli—; *Hindi:* Banar, Chaksi, Chaksu, Chakut—; *Italian:* Gime d' Egitto—; *Madras:* Karungollu—; *Malayalam:* Karinkolla—; *Marathi:* Kankuti—; *Mundari:* Pirimasuriara—; *Porebunder:* Chamed—; *Sanskrit:* Arangakulitthika, Chakshushya, Chipita, Drikaprasada, Kananottha, Kulani, Kulattha, Kulatthika, Kulmasha, Kumbhakarini, Kurubilwaka, Lochanahita—; *Persian:* Chashmizak, Chashum, Cheshmak—; *Sind:* Chowun—; *Sinhalese:* Butora, Kalukollu—; *Tamil:* Edikkol, Karunganam, Kattukol, Mulaippalvirai—; *Telugu:* Chanupalavittulu—; *Urdu:* Chakshu—.

10. **Cassia mimosoides** Linn. Sp. Pl. (1753) 379.—Plate 356B.

A diffuse perennial 30-90 cm. high, usually erect, but sometimes

spreading; stems and branches terete, more or less hairy. Leaves abruptly-pinnate, 5-10 cm. long; rhachis very slender, curved, glabrous or pubescent, with a flat sessile gland on the very short petiole close below the lower pair of leaflets; stipules 4-6 mm., ovate, lanceolate, cuspidate. Leaflets very numerous (40-60 pairs), crowded and overlapping, sessile, 4-6 by 1.25-1.5 mm., linear, subacute, obliquely mucronate, very unequal-sided, glabrous, base oblique, rounded; nerves strong, prominent beneath. Flowers axillary, solitary, or 2-3 together; pedicels unequal, 1.3-2.5 cm. long, slender, pubescent; bracts beneath the pedicels lanceolate-cuspidate; bracteoles 2, a little below the calyx, linear-lanceolate, very acute. Calyx 5-6.5 mm. long, sparingly pilose; segments unequal, membranous, oblong-lanceolate, very acute. Petals 4.5-6.5 cm. long, elliptic, obtuse, with a longish claw, yellow. Stamens 10, all perfect, alternately long and short. Ovary silky-pubescent more especially on the sutures. Pods 3.8-5 by 0.4 cm., linear, nearly straight, flat, marked with oblique transverse depressions between the seeds, sparsely clothed with short hairs. Seeds 15-25, obliquely obovoid, compressed, brown, shining.

Distribution: Throughout India, Ceylon.—Tropics generally.

Among the Santals, the root is given for spasms in the stomach.

Among the Mundas of Chota Nagpur, the root of this plant ground together with the tongue of a frog and a snail is a remedy against delirium.

In the Gold Coast, the plant is sometimes used medicinally as a cure for colic.

Betsileo: Kelimanjakalanitra, Manondrolanitra—; *Hausa:* Bagaruwar kassa—; *Mundari:* Birbiri—; *Santal:* Patwaghas—; *Sinhalese:* Binsiyambala—; *Telugu:* Nelaponna—.

11. **Cassia pumila** Lam. Encyc. Method. I (1784) 651.

Suffruticose, diffuse or procumbent; stems numerous, spreading, about a 30 cm. long; branches slender, clothed with weak spreading white hairs. Leaves 2.5-5 cm. long; rhachis hairy; common petiole 3-4 mm. long, with a peltate stalked gland on the petiole below the leaflets; stipules 5 mm. long, lanceolate, very acute, nerved.

Leaflets subsessile, 10-20 pairs, 6-13 by 2.5-3 mm. (the upper and lower smaller than the middle ones), linear-oblong, very unequal-sided, rounded and apiculate at the apex, usually glabrous; nerves conspicuous beneath. Flowers usually solitary or 2-3 together, supra-axillary; pedicels very short, slender; bracts beneath the pedicels lanceolate; bracteoles 2 above the middle of the pedicel, lanceolate. Calyx divided to the base, 2.5-3 mm. long, pubescent; segments oblong-lanceolate, acute, subequal. Petals 4 mm. long, yellow, obovate-cuneate, tender, veined. Stamens 5; anthers equal. Ovary densely pubescent; style short; stigma peltate, concave, fringed. Pods 2.5-3.8 by 0.4-0.5 cm., with oblique partitions between the seeds, linear, straight, or very slightly curved, flat, glabrous or with a few scattered hairs. Seeds 6-12, obovoid-cuneate, compressed, brown.

Distribution: Througout India.—Tropical Asia and Australia.

In Indo China, the seeds are given as a purgative.

Canarese: Nelatagache—; *Gujerati:* Chamediyun—; *Indo China:* Me dat—; *Marathi:* Sarmal—; *Porebunder:* Chamediyun—; *Telugu:* Nallajiluga—.

12. **Cassia angustifolia** Vahl Symb. Bot. I, 29.—*C. lanceolata* Wall. Cat. 5318; Royle Ill. t. 37.—*Senna officinalis* Roxb. Fl. Ind. II, 346.

Shrub or undershrub with pale subterete or obtusely angled erect or ascending branches. Leaves usually 5-8-jugate; leaflets oval-lanceolate, glabrous. Racemes axillary, erect, laxly many-flowered, usually considerably exceeding the subtending leaf. Bracts membranous, ovate or obovate, caducous. Sepals obtuse, membranous. Legume flat, 15-17 mm. in breadth. Seeds obovate, cuneate, compressed; cotyledons plane.

Distribution: Tropical Africa.—Grown in some places in India.

The plant is useful in constipation, loss of appetite, liver complaints, abdominal troubles, splenic enlargements, dyspepsia, typhoid, jaundice, anæmia, leprosy, poisoning symptoms, foul breath, bronchitis, tumours (Ayurveda).

The plant affords a senna of good quality.

Arabic: Sanaehindi—; *Bengal:* Sannamakki, Shonpat, Sonpat—; *Burma:* Puvekainyoe—; *Canarese:* Nelavare, Nelavarike, Sonamukhi—; *Chinese:* Fan Hsieh Yeh, Ta Hwai Yeh—; *Deccan:* Natkisana, Natkisanakapatta—; *English:* Bombay Senna, Indian Senna, Lotus Senna, Medicinal Senna, Tinnevelly Senna—; *Gujerati:* Middiawal, Senamakhi—; *Hindi:* Bhuikhakhasa, Hindisana, Hindisanakapat—; *Malaya:* Siah Yip—; *Malayalam:* Nilavaka—; *Marathi:* Bhuitarvada, Mulkacha, Shonamakhi, Sonamukhi—; *Persian:* Sonaehindi—; *Sanskrit:* Bhumiari, Bhumichari, Bhumivalli, Bhupadma, Hemapatri, Hemapatrika, Jalatika, Kalyani, Mahaushadhi, Malaharini, Markandika, Mridurechani, Pitapushpi, Rechani, Stholotpala, Svarnamukhi, Svarnapatri, Svarnapatrika, Svarnini—; *Sinhalese:* Nelavari, Nilavari, Sanakola—; *Tamil:* Kattunilavirai, Nilavagai, Nilavirai—; *Telugu:* Nelaponna, Nelatangedu—; *Uriya:* Shonamukhi—.

13. **Cassia javanica** Linn. Sp. Pl. (1753) 379.

A medium sized tree. Bark smooth, dark brown. Branches spreading almost horizontally with alternate, bifarious, spreading-flexuose branchlets. Leaves alternate, bifarious, pinnate, from 15-30 cm. long. Leaflets generally from 8-14 pairs, though on the small lateral floriferous branchlets they are often only from 2-3-4 pairs, all very short-petioled, oval, oblong, entire, very obtuse or even marginate and smooth, from 2.5-5 cm. long and about half that in breadth. Petioles without glands. Stipules cresent-shaped, lower half narrower, and less obtuse, the upper half much broader and emarginate, with a bristle. Racemes terminal, on short lateral branchlets. Bracts 10, cordate, cuspidate, 1-flowered. Pedicels long, and slender. Calyx of 5, ovate, dull reddish leaflets, many times smaller than the corolla. Petals oblong, differing in size only, of a lively pink or rose colour. Stamens 10, all fertile, the 3 lower filaments much longer, and having each an oval swelling near the middle and a double curve below it. Anthers on the 3 long filaments ovate; on the other 7 incumbent, with pores at the small end. Ovary long-stalked, awl-shaped, 1-celled, containing numerous seeds

attached to the upper suture. Pod cylindric, from 45-60 cm. long and about 2 cm. diam., covered with very dark brown, rather smooth bark. Seed solitary, obovate, a little compressed, the size of a pea, smooth, of a shining brown colour.

Distribution: A native of Sumatra and Java.—Planted in the Malay Peninsula, Calcutta, Bombay, very likely elsewhere.

In French Guiana, it is used as a substitute for *C. fistula.*

French Guiana: Casse-para—.

14. **Cassia tora** Linn. Sp. Pl. (1753) 376.—Plate 353.

An annual fetid herb 30-90 cm. high. Leaves 7.5-10 cm. long; rhachis grooved, more or less pubescent, with a conical gland between each of the 2 lowest pairs of leaflets; stipules 1.3-2 cm. long, linear-subulate, caducous. Leaflets 3 pairs, opposite, 2.5-4.5 by 1.3-2.5 cm. (the lowest pair the smallest), obovate-oblong, glaucous, membranous, glabrous or more or less pubescent, base somewhat oblique, usually rounded; main nerves 8-10 pairs; petiolules 2.5 mm. long, pubescent. Flowers usually in subsessile pairs in the axils of the leaves, the upper crowded; common peduncle in fruit not exceeding 4 mm. long; pedicels in fruit rarely exceeding 8 mm. long. Calyx glabrous, divided to the base; segments 5 mm. long, ovate, acute, spreading. Petals 5, pale yellow, subequal, 8 by 2.5 mm., oblong, obtuse, spreading, the upper petal (standard) 2-lobed, the others entire. Stamens 10, the 3 upper reduced to minute staminodes, the remaining 7 perfect, subequal. Pods 12.5-20 cm. by 4-5 mm., subtetragonous, much curved when young, obliquely septate, puberulous, not reticulate, the sutures very broad. Seeds 25-30, rhombohedral, with the long axis in the direction of the pod.

Distribution: Throughout India, Ceylon and the tropics generally.

The leaves are used as a laxative in the form of a decoction.

Both leaves and seeds constitute a valuable remedy in skin diseases, chiefly for ringworm and itch.

In China, the seeds are used externally and internally for all

sorts of eye diseases; preparations are also given for liver complaints and boils.

In Indo China, the pods are used in dysentery and in diseases of the eye.

In Nigeria, the leaves are used as a mild laxative.

The weed is used in various Gold Coast medicines, chiefly as a purgative.

In Madagascar and La Reunion, the root is considered bitter, tonic, stomachic. The leaves are used as an antiperiodic, aperient, anthelmintic; they are given to children with intestinal troubles.

The root is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Sanjsaboyah—; *Bengal:* Chakunda, Panevar—; *Betsileo:* Voamahatsara, Voatelondolo—; *Bombay:* Kovariya, Kowaria, Tankala—; *Burma:* Dangwe, Dangywe, Kujne—; *Canarese:* Chagache, Chogache, Chogata, Gundutagache, Tagache, Taragasi, Vanavarike—; *Ceylon:* Vaddutakarai—; *Chinese:* Chueh Ming, Tsao Chueh, Ts'ao Kiue Min—; *Cutch:* Punvar—; *Deccan:* Tarota—; *Dehra Dun:* Panwar—; *English:* Fetid Cassia—; *French:* Petite casse puante—; *Gujerati:* Kawario, Kuvadio, Kovariya, Ponvadio—; *Hausa:* Tafasa—; *Hindi:* Chakavat, Chakunda, Pamad, Panevar—; *Indo China:* Dau giau, Dau ma, Lac gioi, Meun quyet minh, Nia leung, Quyet minh, Thao kit tam—; *Lambadi:* Pambadiar—; *Malaya:* Chow Keat—; *Malayalam:* Chakramandrakam, Takara—; *Marathi:* Takala, Takla, Tankli, Taranvata, Tarota—; *North-Western Provinces:* Panwar—; *Persian:* Sangsaboyah—; *Porebunder:* Kunvadio, Ponvadia—; *Punjab:* Chakunda, Panwar, Pawar, Pawas—; *Sanskrit:* Ayudham, Chakramarda, Chakramardaka, Dadamandan, Dadamari, Dadrughna, Prabhunatha, Praputrata, Praputatri, Prishnaparni, Taga—; *Santali:* Chakaoda arak—; *Sinhalese:* Petitora—; *Swahili:* Mwango—; *Tagalog:* Balatongaso, Catanda, Catandangaso, Manimanihan, Mongonongohan—; *Tamil:* Senavu, Sirutagarai, Tagarai, Usittagarai, Vanamavaram, Vindu—; *Telugu:* Tagirise, Tantemu, Tantiyamu—; *Tulu:* Tajanku—; *Twi:* Mmorfra brorde—; *Uriya:* Chakunda—.

CYNOMETRA Linn.

Erect unarmed trees or shrubs. Leaves abruptly-pinnate; stipules caducous. Leaflets few pairs, coriaceous, oblique. Flowers small, in axillary corymbose or racemes. Calyx with a very short tube and subbasal disk; segments 4-5, imbricate, reflexed during flowering. Petals 5, subequal or the lowest minute, imbricate. Stamens 10, free, filaments filiform; anthers small, uniform, dehiscing longitudinally. Ovary sessile or shortly stalked; ovules 2; style filiform; stigma capitate. Pod arcuate-ovoid or subreniform (rarely straight) with thick turgid or subcompressed usually rugose though somewhat fleshy indehiscent valves. Seed filling the cavity, exalbuminous; cotyledons thick, fleshy; radicle very short, straight, included.—Species 30.—Tropics.

1. Leaflets 2-4 .... 1 *C. mimosoides.*
2. Leaflets usually 2 .... 2. *C. cauliflora.*

C. cauliflora Linn. is used medicinally in Malaya.

1. **Cynometra mimosoides** Wall. Cat. n. 5817.—*C. ramiflora* Linn. var. *mimosoides* Baker in Hook. f. Fl. Brit. Ind. II (1878) 267.—PLATE 358 (under *C. ramiflora*).

A shrub or small tree growing near the sea-coast. Leaves 7.5-12.5 cm. long; rhachis grooved, glabrous or puberulous. Leaflets 2 pairs, 3.8-9 by 2-3.8 cm., coriaceous, obliquely obovate-oblong, often emarginate, subsessile, dark green, glabrous, shining above, base obliquely cuneate; main nerves numerous, distinct. Flowers in small axillary corymbose racemes; pedicels slender, 6-10 mm. long; bracts broadly ovate, deciduous; bracteoles small, lanceolate. Calyx-tube very short; segments ovate-lanceolate, 2.5-3 mm. long. Petals white, linear-lanceolate, 4 mm. long. Pods fleshy, much wrinkled, turgid, 1.3-2.5 cm. long, irregularly oblong or ovoid, with a thick fleshy pointed tip.

Distribution: W. Peninsula, Sundribuns, Burma.—Malaya.

The root is purgative. A lotion is made from the leaves boiled in cow's milk, which, mixed with honey, is applied externally in

scabies, leprosy and other cutaneous diseases. An oil is also prepared from the seeds and used for the same purpose (Rheede).

Bengal: Shingr—; *Burma:* Kabeng, Myengkabin, Myinkaben, Mymeng—; *Canarese:* Kanaga—; *Indo China:* Rang—; *Malayalam:* Irripa—; *Sanskrit:* Madhuka—; *Sinhalese:* Galmendora—; *Sundriban:* Shingar, Shingra—; *Tagalog:* Balitbitan—; *Tamil:* Irudbu, Nayppudukkan—; *Tarlac:* Ulud—; *Visayan:* Odling—.

2. **Cynometra cauliflora** Linn. Sp. Pl. (1753) 382.

Branchlets slender, glabrous. Petioles very short; leaflets usually 2, very rarely bijugate, and if so very unequal, rigidly coriaceous, sessile, glossy, obovate, very oblique obtuse or subacute, 7.5-15 cm. long. Flowers in dense sessile congested racemes, racemes in dense rounded masses, not more than about 2.5 cm. long, the central axis of each produced, the short erecto-patent pedicels subtended by small roundish spreading persistent bracts. Calyx 3 mm. Pod oblique oblong, very turgid, rugose, 2.5-3.8 cm. long, subsessile.

Distribution: Malay Islands, sometimes cultivated in Indian gardens.

An oil prepared from the seeds is applied externally in leprosy and other cutaneous diseases.

Ceylon: Namnam—; *Malay:* Niamniam—; *Malayalam:* Iripa—.

Hardwickia Roxb.

Unarmed trees. Leaves abruptly-pinnate. Leaflets 1-3 pairs, coriaceous. Flowers numerous, small, in panicled racemes. Calyx with scarcely any tube and a subbasal disk; segments usually 5, oblong or suborbicular, petaloid, subequal, imbricate. Petals 0. Stamens 10, the alternate ones slightly shorter; anthers dehiscing longitudinally. Ovary sessile, free; ovules 2. Pod subindehiscent, dry, with only the upper seed perfect. Seeds exalbuminous.—Species 3.—Africa, Asia.

The genus is therapeutically inert.

1. **Hardwickia pinnata** Roxb. Hort. Beng. (1814) 43; Fl. Ind. II (1832) 423.—PLATE 359.

A very large, unarmed tree. Wood moderately hard; sapwood large; heartwood dark red, or reddish brown, exuding a red, sticky resin. Leaves, abruptly pinnate, with few leaflets. Leaflets 4-6, alternate, petiolate, not oblique, oblong, rigidly coriaceous, acute, 5-10 cm. long, venulose, the upper of the uppermost pair sometimes apparently terminal; midrib central veining pinnate; petiolules 4-6 mm. Panicles copious, axillary and terminal, formed of dense slender, cylindric racemes; pedicels spreading, 1-2 mm. Calyx broadly campanulate, under 2 mm. long, with a pair of minute adpressed bracteoles. Filaments twice as long as the sepals. Stigma minute. Pod turgid, 3.8-5 cm. long, obovoid or oblong, nearly or quite filled up by the seed, sublignose, rigid.

Distribution: Evergreen forests of the W. Ghats from S. Kanara to Travancore.

The balsam of Hardwickia has been used in India for gonorrhœa.

The oil, as reported by the Imperial Institute, London, cannot substitute copaiba oil. The enquiry as to the uses of the oil and the resin has so far given negative results (1911).

The oleoresin has been studied by Sitaramiyer and Sudborough (*Journ. Ind. Inst. Sc.;* II, 1918-1920).

Canarese: Enne, Jennuyenne—; *Coorg:* Choupaini—; *English:* Malabar: Mahogany—; *Kadir:* Uram—; *Malayalam:* Kiyavu, Kodapalla, Kolla, Kulayu, Shirali, Shurali, Surali, Suvannapayani—; *Marathi:* Anjana—; *Tamil:* Enneykolavu, Kodapalai, Kudaippali, Madanchambrani, Madeyansampirani—.

SARACA Linn.

Erect trees. Leaves abruptly pinnate; stipules large, intrapetiolar, completely united, or rarely foliaceous and partially free. Leaflets usually of few pairs, coriaceous. Flowers in dense sessile paniculate (rarely simple) corymbs on old nodes, or rarely axillary; bracts small, deciduous; bracteoles persistent, coloured, shorter than the tube of the calyx. Calyx petaloid; tube elongate, cylindric,

crowned by a lobed disk; segments 4, oblong, subequal, imbricate. Petals 0. Stamens 2-9, free, exserted; filaments long, filiform; anthers oblong, versatile, dehiscing longitudinally. Ovary stalked, the stalk attached to and produced beyond the disk; ovules many; style filiform; stigma minute, capitate. Pod flat, dehiscent, rigidly coriaceous. Seeds exalbuminous.—Species 10.—Tropical Asia.

The genus is not therapeutically defined.

1. **Saraca indica** Linn. Mant. (1767) 98.—*Jonesia Asoka* Roxb. in As. Res. IV (1795) 355.—Plate 360.

A tree 6-9 m. high; branches glabrous. Leaves 15-25 cm. long; rhachis glabrous, corky at the base; petioles very short; stipules intrapetiolar, completely united, 10-13 by 6 mm., scarious, ovate-oblong, obtuse, parallel-nerved. Leaflets 4-6 pairs, 10-20 by 3-5.7 cm., oblong-lanceolate, obtuse or acute, quite glabrous, base rounded or cuneate, slightly oblique; petiolules 4.5-6.5 mm. long, stout, wrinkled; stipels deciduous. Flowers fragrant, numerous, in dense axillary corymbs 7.5-10 cm. across; peduncels stout; pedicels 8-13 mm. long, red, glabrous; bracts ovate, subacute; bracteoles 2, appearing like a calyx, 4 mm. long, spathulate-oblong subacute, ciliolate, amplexicaul, coloured. Calyx passing from yellow to orange and finally red; tube 1.3-2 cm. long, cylindric, solid at the base; segments 4, oblong or obovate-oblong, 1 cm. long. Petals 0. Stamens 7 or 8, much exserted; filaments filiform, thrice as long as the calyx-segments; anthers purple. Ovary pubescent, especially on the sutures; style curved into a ring. Pods black, 10-25 by 4.5-5 cm., linear-oblong, tapering to both ends, compressed, glabrous, veined. Seeds 4-8, ellipsoid-oblong, 3.8 cm. long, slightly compressed.

Distribution: Central and E. Himalaya, E. Bengal, Burma, W. Peninsula, Ceylon.—Malaya.

The bark is bitter and acrid; refrigerant, astringent to the bowels, alexiteric, anthelmintic, demulcent, emollient; cures dyspepsia, thirst, burning sensation, diseases of the blood, biliousness, effects of fatigue, tumours, enlargement of the abdomen, colic, piles, ulcers, bloody discharges from the uterus, menorrhagia; useful in fractures

of the bones; beautifies the complexion.—The seeds are useful in urinary discharges (Ayurveda).

The bark is much used in uterine affections and especially in menorrhagia. A decoction of the bark in milk is generally prescribed.

The flowers pounded and mixed with water are used in hæmorrhagic dysentery.

A liquid extract of the bark of this plant which is strongly astringent was administered to cases of menorrhagia and found to do considerable good. The action was slow. It took on an average three days to produce the desired effect (Koman).

The bark, flowers, and fruit are prescribed in combination with other drugs for the treatment of snake-bite and scorpion-sting (Sushruta).

The bark, flower, and fruit are all equally useless in the treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Bengal: Asok, Asoka—; *Bombay:* Ashok, Asok, Asoka, Jasundi—; *Burma:* Thawgabo, Thawka—; *Canarese:* Akshath, Ashanke, Ashoka, Ashuge, Kenkali, Kusge—; *Cuttack:* Aseka, Ati—; *English:* Asoka Tree—; *Gujarat:* Ashopalava—; *Hindi:* Ashok, Asok—; *Konkani:* Assoc—; *Malayalam:* Asoka, Hemapushpam, Vanjulam—; *Manipur:* Asoka—; *Marathi:* Ashoka, Jasundi—; *Mundari:* Husanggidha daru—; *North-Western Provinces:* Asok—; *Punjab:* Asok—; *Sanskrit:* Anganapriya, Apashoka, Ashoka, Chakraguchha, Chitra, Dohali, Doshahari, Gandhapushpa, Hemapushpa, Kankali, Kankelli, Kantacharandohada, Kantanghridohada, Karnapura, Karnapuraka, Kelika, Krimikaraka, Madhupushpa, Nata, Palladru, Pindapushpa, Pindipushpa, Prapallava, Raktapallava, Rama, Rogitaru, Shhaya, Shokaharta, Shokanasha, Smaradhivasa, Strinirikshanadohada, Subhaga, Tamrapallava, Vamanghrighataka, Vamankayatana, Vanjula, Vanjuldruma, Vichitra, Vishoka, Vitashoka—; *Sinhalese:* Diyaratmal, Diyeratembela—; *Tamil:* Asogam, Asogu, Anagam, Malaikkarunai, Sasubam—; *Telugu:* Asokamu, Vanjulamu—; *Uriya:* Osoko—.

CERATONIA Linn.

A tree. Leaves abruptly pinnate. Flowers small, red; polygamous or dioecious. Calyx-tube shortly turbinate, segments 5, dentiform deciduous; petals absent. Stamens 5, free. Filaments elongate, anthers versatile. Legume elongated, stout, coriaceous, compressed, indehiscent, divided by pulp between the seeds.—Species 1.—Mediterranean.

C. siliqua Linn. is used medicinally in Southern Europe.

1. **Ceratonia siliqua** Linn. Sp. Pl. (1753) 1513; Lam. Ill. t. 859.

A small evergreen dioecious tree. Leaves paripinnate. Leaflets 3-5 pairs, opposite, 3.8-5 cm. long, elliptic or broadly obovate, emarginate, dark glossy-green and glabrous above, minutely pubescent beneath. Flowers unisexual, minute, green, in spike-like racemes 5-30 cm. long, axillary from the old wood. Calyx small saucer-shaped, lobes very short. Petals wanting. Stamens 5, filaments long. Disk conspicuous, intra-staminal. Ovary shortly stipitate, arising from the centre of the disk, grey-pubescent; stigma large, capitate, subsessile. Pod 7.5-20 by 1.3-2.5 cm., curved, compressed, thick and turgid, seeds pale brown, shining, embedded in pulp.

Distribution: A native of the E. Mediterranean region. Introduced into India.

The pods are used in coughs attended with much expectoration. The husk is considered antacid, purgative, pectoral, and astringent.

The Arabs view the pods as cold, dry, and astringent.

In Southern Europe, the pods are considered pectoral and they are prescribed in cough and asthma.

Arabic: Kharnub, Khirnub—; *Catalan:* Garrofe—; *Dutch:* Jans Broodboom, Karobenboom—; *English:* Bread Bean, Carob Tree, Locust Bean, Locust Tree, St. John's Bean—; *French:* Caroubier, Carouge—; *German:* Caruba, Johannisbrodbaum, Karobbaum, Sodbrodbaum—; *Greek:* Keratia, Keratonia—; *Italian:* Carobe, Carobo, Carobole, Carrubio, Carrubo, Guainella—; *Malta:* Carob, St. John's Bread, Locust Tree, Carrubo, Harruba—;

Portuguese: Alfarrobeira—; *Punjab:* Kharnub—; *Roumanian:* Roscov—; *Russian:* Rojkovvi derevo—; *Spanish:* Algaroba, Algarrobo, Garrofero—; *Swedish:* Johannisbrod—.

HAEMATOXYLON Linn.

Species about 3.—Tropical America.

H. campechianum Linn. is used medicinally in Guiana and the West Indies.

1. **Haematoxylon Campechianum** Linn. Sp. Pl. (1753) 384.

A medium-sized tree, reaching 9-13.5 m. with a short crooked trunk. Leaves abruptly pinnate; leaflets obversely egg-shaped. Flowers small, yellow, in axillary racemes. Petals 5, oblong, expanding. Stamens free, rather upright, with filaments hairy at base. Ovary short-stiped, free, with 2-3 seeds. Pod lanceolate, flattened, dehiscing along the median valve in 2 boat-shaped pseudo-valves.

Distribution: Tropical America.—Introduced into India.

Prescribed as a decoction and extract the heart-wood is a mild astringent and tonic, and is useful in chronic diarrhœa, atonic dyspepsia, and infantile diarrhœa. The decoction has been found a valuable injection in leucorrhœa.

As an ointment the wood is useful in cancer and hospital gangrene.

In Guiana, the bark and the wood are used as astringents in chronic diarrhœa.

Bengal: Bokkan—; *Canarese:* Partanga—; *Dutch:* Kampecheboom—; *English:* Campeachy Tree, Logwood—; *French:* Bois bleu, Bois a flambeaux, Bois d' Inde, Bois de la Jamaique, Bois de Nicaragua, Bois rouge, Bois de sang, Campeche, Campeche epineux—; *French Guiana:* Campeche—; *German:* Kampeschebaum—; *Italian:* Campeggio, Campiggio—; *Portuguese:* Campeche—; *Roumanian:* Bacan—; *Russian:* Kampesh—; *Spanish:* Campeche—; *Telugu:* Gabbi—.

TAMARINDUS Tourn. ex Linn.

Species 1.—Perhaps a native of tropical Africa; now planted throughout the tropics.

T. indica Linn. is used medicinally wherever it is found growing.

OFFICIAL:—The pulpy portion of the fruit of *T. indica* Linn. (Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Switzerland, Turkey)=*T. officinalis* Hook. (Portugal), and *T. occidentalis* Gaertn. (Portugal).

1. **Tamarindus indica** Linn. Sp. Pl. (1753) 34.—PLATE 361.

A large tree 12-18 m. high; branches spreading, glabrous. Leaves 5-12.5 cm. long; rhachis slender, channelled; stipules linear, caducous. Leaflets subsessile, 10-20 pairs, tolerably closely set on the rhachis, 8-30 by 5-8 mm., oblong, obtuse, glabrous, reticulately veined. Flowers in lax few-flowered racemes at the ends of the branchlets; pedicels 6-10 mm. long, slender, articulated below the calyx, glabrous; bracts concave, 6-8 mm. long, enclosing the buds, caducous; bracteoles small. Calyx 1.3 cm. long; tube narrowly turbinate, 4 mm. long; segments 8 mm. long, subequal, oblong, somewhat oblique, obtuse or subacute. Petals 3 (an upper and 2 lateral), 1 cm. long, subequal, obovate-oblong, yellowish with pink stripes. Stamens 3 fertile, connate nearly half their length; filaments pubescent at the base; anthers oblong. Ovary stalked; ovules 8-12 or more; style pubescent, equalling the stamens. Pods 7.5-20 cm. long by 2.5 cm. broad and about 1 cm. thick, slightly curved, subcompressed, scurfy. Seeds 3-12, obovate-oblong, truncate at the ends, 1.6 by 0.8 cm., compressed with a shallow oblong pit on each of the flat faces, smooth, brown, shining.

The bark is used topically for loss of sensation in paralysis; the ash is given for urinary discharges and gonorrhœa. The leaves are applied to reduce inflammatory swellings, tumours, ringworm; useful in diseases of the blood, smallpox, ophthalmia and other eye diseases, earache, snake bite.—The flowers are acrid, sweet, sour,

tasty, appetising; cure "vata" and "kapha", urinary discharges, bad odour in perspiration.—The unripe fruit is sour, tasty; indigestible, astringent to the bowels; cures "vata"; causes biliousness, cough, and blood troubles.—The ripe fruit is appetising, laxative, heating, tonic to the heart, anthelmintic; cures "vata" and "kapha"; heals wounds and fractures.—The seeds are useful in vaginal discharges and ulcers (Ayurveda).

The bark has astringent and tonic properties; heals ulcers.—The leaves reduce inflammatory swellings.—The fruit is sour, sweetish and bitterish; laxative; useful in liver complaints, vomiting, thirst, scabies, sore throat, stomatitis; causes biliousness and impoverishes the blood.—The pulp of the fruit is tonic to the heart, astringent and aperient; useful for checking bilious vomiting.—The seeds are astringent, aphrodisiac; useful in giddiness and vertigo; applied externally in liver complaints and inflammations (Yunani).

The ripe fruit is regarded as refrigerant, digestive, carminative and laxative, and useful in diseases supposed to be caused by deranged bile, such as burning of the body, costiveness, intoxication from spirituous liquors or dhatura, etc. The cells of the ripe fruit are burnt and their ashes used in medicine as an alkaline substance, along with other medicines of the sort. The pulp of the ripe fruit, as well as a poultice of the leaves, is recommended to be applied to inflammatory swellings.

A gargle of Tamarind water is recommended in sore-throat. The seeds are said to be a good astringent; boiled, they are used as a poultice to boils; pounded with water they are applied to the crown of the head in cough and relaxation of the uvula.

The leaves crushed with water and expressed yield an acid fluid, which is said to be useful in bilious fever and scalding of the urine; made into a poultice, they are applied to reduce inflammatory swellings, and to relieve pain. A poultice of the flowers is used in inflammatory affections of the conjunctiva; their juice is given internally for bleeding piles.

In case of a scorpion-sting Subodhavaidyaka recommends the

application to the sting of a tamarind fruit made very hot in the fire.

At Nasirabad, the leaves are pounded and mixed with water and drunk as a cooling beverage (Hughes-Buller).

In Ceylon, the tender leaves are used as poultices for boils, and also as fomentations; the seeds are used for diarrhœa.

Every part is used medicinally in Madagascar. A decoction of the bark is given in asthma and in amenorrhœa; an infusion of the leaves is used as an anthelmintic and in troubles of the stomach.

The sweet pulp in the fruits is much eaten on the Gold Coast and acts as a laxative. A tincture of the bark in spirit is used in curing diarrhœa.

In Guinea, the bark is used as an astringent. The boiled leaves are used to wash wounds; dried and powdered they are caustic and slightly astringent and applied to bad ulcers; freshly pounded they are made into a poultice to reduce swellings, sprains, etc. The pulp of the fruit is a household remedy for fever, dyspepsia, gastritis, dysentery, diarrhœa, etc.

In Cambodia, the bark is used as an astringent in diarrhœa and gingivitis. It is also given as a tonic. The wood is considered a mild purgative and diuretic. The leaves are used externally in scabies and in conjunctivitis. The fruit is an antidote to *Hydnocarpus anthelmintica* Pierre.

Arabic: Daralsida, Hommar, Homr, Humar, Sabara, Tamarehindi, Tommar, Umbli—; *Assam:* Teteli—; *Bengal:* Ambli, Nuli, Tentul, Tetai, Tintil, Tintiri, Tinturi—; *Bicol:* Sambac, Sampalagui, Sampaloc—; *Bombay:* Ambli, Amli, Chinch, Chincha, Chintz—; *Brazil:* Jubay, Tamarindo—; *Burma:* Magi, Magyi—; *Cambodia:* Ampil—; *Canarese:* Amla, Amli, Amlike, Gotu, Huli, Hunase, Hunise—; *Central Provinces:* Chinch, Imli—; *Coorg:* Pulinje—; *Danish:* Tamarintraee—; *Deccan:* Ambli, Amli—; *Dutch:* Tamarinden boom—; *English:* Tamarind Tree—; *Ewe:* Yevutsitoe—; *Fanti:* Tamrisi—; *French:* Assam, Tamar indien, Tamarinier—; *Fulah:* Dia be—; *Ga:* Blorfo yoryitsho—; *German:* Tamarindenbaum—; *Gond:* Chita, Hitta, Sitta—;

Gujarat: Ambli, Amli—; *Haldwani:* Imli—; *Hausa:* Tsamiya—; *Hindi:* Amli, Amlica, Anbli, Imli, Nuli, Tamrulhindi, Teter—; *Ilocano:* Salomague, Salumagui—; *Indo China:* Ampil, Khoua me, Mak kham, Me—; *Italian:* Tamarindo, Tamaro—; *Kamba:* Muthumura—; *Khond:* Veddi—; *Kolami:* Joj, Jojo—; *Konkani:* Chinch—; *Krobo:* Blairfomiairletsho, Dudwengtsho—; *Kurku:* Chicha—; *Lambadi:* Amblairo—; *La Reunion:* Tamarinier, Tamarinier des bas—; *Madagascar:* Madiro—; *Malay:* Asam jawa—; *Malayalam:* Amlam, Amlika, Madhurappuli, Puli, Sinja, Sukram, Tintrini, Valampuli—; *Malinke:* Tombi—; *Marathi:* Ambali, Amli, Chicha, Chinch, Chincha, Chitz—; *Masai:* Ol masamburai—; *Meru:* Muthithi—; *Merwara:* Amli—; *Mexico:* Tamarindo—; *Mundari:* Jojo daru—; *Mysore:* Asam, Hunese, Kamal, Karangi—; *Nasirabad:* Amlai, Amli, Imbli—; *Nepal:* Titri—; *North-Western Provinces:* Imli—; *Oudh:* Imli—; *Pampangan:* Sampaloc—; *Persian:* Ambalah, Tamarihindi—; *Philippines:* Tamarindo—; *Portuguese:* Tamaindo, Tamarindo, Tamarindeiro, Tamarinheiro—; *Punjab:* Imli—; *Ramnagar:* Amli—; *Sakalave:* Kililo, Kily, Madilo, Voamatory—; *Sanskrit:* Abdika, Amla, Amli, Amlika, Atyamba, Bhukta, Charitra, Chincha, Chinchika, Chukra, Chukrika, Chukru, Dantashatha, Gurupatra, Panktipatra, Pichhila, Sarvamla, Shakachukrika, Suchakrika, Sukta, Sutintidi, Tintidi, Tintidika, Tintili, Tintrini, Tittidi, Yamadutika—; *Santal:* Jojo—; *Saora:* Shenta—; *Shoran:* Khatambli—; *Sind:* Amri, Gidamri—; *Sinhalese:* Mahasiyambala, Siyambula, Siyembela—; *Soussou:* Toumbingui—; *Spanish:* Tamarindo, Tamarindo de la India—; *Swahili:* Mkwadju—; *Swedish:* Tamarintraed—; *Tagalog:* Macasampaloc, Sampaloc—; *Tamil:* Ambilam, Amilam, Amiligai, Egin, Eginam, Indam, Kinjam, Mugini, Odimam, Puli, Sanjivagarani, Sarittarai, Sevvarai, Sindagam, Sinjam Sindam, Sinduram, Siri, Tindiram, Tindiruni—; *Taveta:* Mzumusa—; *Telugu:* Amlika, Chinta, Sinja, Sinta, Tintrini, Tintrinikamu—; *Tigrinia:* Hommar, Homr, Tommar—; *Tulu:* Punke—; *Twi:* Bororfo songnkongran—; *Urdu:* Imli—; *Uriya:* Koina, Konya, Koya, Omlika, Tentuli, Tintidi—; *Visayan:* Camalagui, Samalagui, Sambag, Sambagui, Sumalagui—; *Wolof:* Dakhar—.

Humboldtia Vahl.

Unarmed erect small trees. Leaves abruptly pinnate, with persistent usually peltate stipules. Flowers small, in copious racemes, each furnished with a pair of persistent coloured bracteoles at the base. Calyx-tube turbinate, with the disk produced some distance above its base; sepals 4, oblong, subequal, imbricated. Petals 5 or 3, oblong-spathulate, clawed, subequal, exceeding the calyx. Stamens 5, equal, exserted, alternating with 5 minute staminodes, filaments filiform; anthers oblong, versatile, dehiscing longitudinally. Ovary with a stalk immersed in the disk, linear, few-ovuled; style very long, filiform, stigma terminal. Pod flat, dehiscent, rigidly coriaceous. Seeds exalbuminous.—Species 4.—Ceylon and S. India.

The genus is therapeutically inert.

1. **Humboldtia vahliana** Wight Ic. t. 1607-8.

An unarmed erect small tree; branches solid, nodes not constricted, branchlets slender, terete. Stipules 2.5 cm. or more long, lanceolate above, transversely oblong below the point of attachment, the spur of stipules rounded. Leaves distinctly petioled. Rhachis 12.5-18 cm. long including the 2.5 cm. petiole. Leaflets 6-8, oblong, lanceolate, acuminate, glabrous, rigidly coriaceous, 12.5-15 cm. long, both sides finely venulose, petiolules long. Racemes peduncled, subspicate, 1-3-nate, bracteoles and sepals very downy on the back, the latter 1 cm. long. Petals 5, very caducous, not exceeding the sepals. Pod almost woody 15 by 3.8 cm., narrowed to the point.

Distribution: Nilgiris.

The bark is used in biliousness, leprosy, ulcers, and epilepsy.

Malayalam: Kurappunnu, Kurati—; *Tamil:* Attuvanji—.

Bauhinia Linn.

Unarmed erect trees, or climbing shrubs with circinate tendrils. Leaves usually simple, more or less deeply cleft from the apex, rarely entire, or fully divided into 2 leaflets; stipules

various, usually small, caducous. Flowers usually white, in simple terminal or rarely axillary racemes, or arranged in a large terminal or corymbose panicle. Calyx-tube with the disk produced to the top, sometimes long and cylindric, sometimes short and turbinate or campanulate; limb entire and spathaceous, or cleft into 2 or 5 teeth. Petals 5, subequal, erect or spreading, imbricate, the upper the inner. Stamens 10, or reduced to 5 or 3, if fewer than 10 with or without sterile filaments; filaments free, filiform; anthers versatile, dehiscing longitudinally. Ovary stalked (rarely subsessile); ovules many; style long or short; stigma small, or large and peltate, subterminal or oblique. Pod linear or oblong, flat, continuous within, dehiscent or indehiscent. Seeds albuminous.—Species 250.—Tropics.

A. Fertile stamens 10. Calyx with a very short tube and spathaceous limb .... 1. *B. tomentosa.*
B. Fertile stamens 10. Calyx with a short tube and spathaceous or 5-cleft limb. Pod narrow indehiscent
  I. Petals oblanceolate, yellow, as long as the limb .... 2. *B. racemosa.*
  II. Petals oblong, spathulate, little exserted .... 7. *B. malabarica.*
C. Fertile stamens usually 3, sometimes 4-5. Calyx-tube mostly produced. Limb usually 5-cleft
  I. Leaves round, cordate, cleft only at the very tip
    a. Leaves 10-15 cm. long .... 3. *B. retusa.*
    b. Leaves 7.5-45 cm. long .... 4. *B. vahlii.*
  II. Leaves deeply cleft with acute or subacute lobes
    Leaves round, cordate, subglabrous, 9-nerved .... 8. *B. macrostachya.*
  III. Leaves deeply cleft with obtuse or rarely subacute lobes, nearly or quite glabrous beneath when mature
    a. Fertile stamens 3-4. Calyx-tube 6-13 mm. .... 5. *B. purpurea.*
    b. Fertile stamens 3-5. Calyx-tube 2-2.5 cm. .... 6. *B. variegata.*

Mucilaginous and astringent properties. Used in dysentery.

The following are used medicinally in the Philippine Islands—*B. malabarica* Roxb.—; in Brazil—*B. forficata* Link.—; in the Gold Coast—*B. reticulata* DC.—; in Guinea—*B. reticulata* DC., *B. rufescens* Lam.—; in Kenya—*B. reticulata* DC.—; in Southern Africa—*B. esculenta* Burch., *B. reticulata* DC.—; in Cambodia—*B. lassacensis* Pierre.

1. **Bauhinia tomentosa** Linn. Sp. Pl. (1753) 375.—Plate 362.

An erect shrub; branches slender, terete, zigzag, downy. Leaves

broader than long, 2.8-5 by 3.8-6.3 cm., divided a little less than half way down into 2 rounded lobes, glabrous above, pubescent beneath, base truncate or rarely subcordate; main nerves 7 (rarely 9) from the base; petioles 1.3-2.2 cm. long, pubescent, thickened at both ends. Flowers usually in pairs (rarely 1 or 3), on short axillary or leaf-opposed peduncles; bracts linear, 6-13 mm. long; pedicels 5 mm. long, 2-bracteolate. Calyx 2 cm. long, velvety-pubescent; tube 5 mm. long; limb 1.3 cm. long, broadly ovate, spathaceous. Petals 3.8-5 cm. long, much imbricated, obovate-spathulate, yellow, the upper with a purple blotch on the face. Stamens 10, all fertile, subequal. Ovary distinctly stalked, densely tomentose; style 1.3-1.6 cm. long; stigma peltate. Pods stalked, 10-12.5 by 1.3-1.6 cm., flat, pointed, slightly puberulous when fully ripe, veined. Seeds 8-12, oblong, rounded at the apex, 8 by 4.5 mm.

Distribution: N.-W. Provinces, Circars, Carnatic, in dry forests from the Chilka Lake to Tinnevelly, in other parts of India often cultivated, Ceylon.—China, tropical Africa.

All parts of the plant are recommended in combination with other drugs for the treatment of snake-bite and scorpion-sting (Sushruta). In the case of snake-bite the fresh seeds are made into a paste with vinegar, and applied externally to the part bitten.

On the Malabar Coast, a decoction of the rootbark is administered in inflammation of the liver.

The decoction of the rootbark is also used as a vermifuge. The bruised bark is externally applied on tumours and wounds.

The native practitioners in Southern India prescribe the small dried buds and young flowers in dysenteric affections.

The fruit is diuretic; an infusion of the bark is used as an astringent gargle.

All parts of the plant are equally useless in the antidotal treatment of snake-bite. The seeds are also useless as an external application (Mhaskar and Caius). No part of the plant is an antidote to scorpion-venom (Caius and Mhaskar).

Burma: Maha-le-ga-wa—; *Canarese:* Kadatti, Karanasupu, Vanasampage—; *English:* Wild Champak—; *Gujerati:* Asundro, Piloasundro—; *Hindi:* Kachnar, Kanchana—; *Konkani:* Chamal—;

Madras: Mandarai, Usamadura—; *Malayalam:* Kanjanam, Kattatti—; *Marathi:* Aptu, Chan, Pivalakonchan—; *Meru:* Mwangu—; *Mundari:* Kaimu—; *Porebunder:* Champo—; *Pampangan:* Alibanban—; *Sanskrit:* Phalgu, Pitakanchana, Ushmadugha—; *Sinhalese:* Kahapettang, Petan—; *Swahili:* Msaponi—; *Tagalog:* Alibanban—; *Tamil:* Iruvaji, Kanjani, Kattatti, Kattumandarai, Siruvatti, Tiruvatti—; *Telugu:* Adavimandaramu, Devakanjanamu, Kanjelapa, Kanjini, Mandara, Palepi—; *Tulu:* Katarti—; *Visayan:* Alibanban, Alibihil, Ahihiro, Alambihor, Balibanban, Diis, Linas, Marulinao—.

2. **Bauhinia racemosa** Lam. Encycl. Méth. I (1783) 390; Bedd. Fl. Sylv. t. 182.—PLATE 363.

A small crooked tree with dark scabrous bark; branches numerous, drooping. Leaves broader than long, 2-5 by 2.5-6.3 cm., divided a little less than half way down into 2 rounded lobes, green and glabrous above, white and more or less tomentose beneath, base usually cordate; main nerves 7-9; petioles 6-16 mm. long, pubescent. Flowers in terminal or leaf-opposed racemes 5-12.5 cm. long; rhachis densely pubescent; buds pointed; pedicels 3-4.5 mm. long; bracts beneath the pedicels linear, acute. Calyx pubescent; tube very short; limb 6-8 mm. long, spathaceous, at length reflexed. Petals narrowly oblanceolate, acute, 10-11.5 mm. long, white or pale yellow. Stamens 10, all fertile; filaments densely hairy at the base. Ovary pubescent; stigma sessile. Pods stalked, 15-25 by 1.3-2.2 cm., blunt at the apex, tapering to the base, somewhat falcate, glabrous, turgid, not or scarcely veined; stalk 2-2.5 cm. long. Seeds 12-20, oblong, compressed, rounded at the apex, 6-10 by 4.5-6 mm., black.

Distribution: Throughout India, Ceylon.—China, Timor.

The bark and leaves are sweetish and acrid; refrigerant, antipyretic, astringent, alexipharmic, vermicidal; cure biliousness, urinary discharges, thirst, headache, quartan fevers, "vata", anal fistula, tuberculous glands, skin diseases, throat troubles, tumours, diseases of the blood; good in chronic dysentery and diarrhœa.—The fruit is acrid and sweet; refrigerant, astringent to the bowels; removes "kapha" and "vata".—The fibre is used to stitch wounds (Ayurveda).

A decoction of the leaves is used to allay headache in malarious fevers. The gum is used medicinally in South India.

Ajmere: Jhinja—; *Banda:* Mahauli—; *Bengal:* Banraj, Banraji—; *Bhil:* Amba bhosa—; *Bombay:* Wanurajah—; *Burma:* Hpalan, Palan—; *Canarese:* Ara, Aralukadumandara, Arise, Ayata, Banne, Kittarisa—; *Central Provinces:* Dhorara, Maula—; *Deccan:* Ara—; *Dehra Dun:* Jhanjhora, Jhinjhora—; *Gond:* Astra, Bosha, Dhondri, Dhundera—; *Gujerati:* Apta, Asundro, Jenjavo—; *Hindi:* Ashta, Asoda, Dhorara, Ghila, Gurial, Jhanjhora, Jhinjheri, Kachnal, Makkuna, Marvil, Maula, Papri, Shirahuta, Thaur—; *Kathiawar:* Asondaro—; *Kharwar:* Katmanli—; *Khond:* Soveri—; *Kolami:* Kaimu—; *Konkani:* Apta—; *Kurku:* Bossai—; *Lambadi:* Jhinjere—; *Lohardugga:* Katmanli—; *Malaya:* Ambru—; *Malayalam:* Kotapuli, Mandaram—; *Marathi:* Apata, Apta, Kanraja, Seyara, Shiara, Sonan, Vanaraja—; *Mundari:* Kaimu—; *Oudh:* Ashta, Makkuna—; *Panch Mahals:* Asindri, Asindro, Asotri—; *Porebunder:* Asundro—; *Punjab:* Kosundra, Taur—; *Rajputana:* Jinja—; *Saharanpur:* Jhanjhora, Jhinjhora, Papri—; *Sanskrit:* Anupushpaka, Ashmantaka, Kushali, Shlashnatvaka, Svetakanchana, Vanaraja, Yamalapatraka, Yugmapatra—; *Santal:* Beriju—; *Sinhalese:* Mayila—; *Tamil:* Ar, Arai, Aram, Arikka, Atti, Sallagi, Sittacha, Tadagi—; *Telugu:* Adiviyavise, Are, Manjiyare, Pachare—; *Thana:* Apta—; *Tulu:* Arti—; *Uraon:* Gatonli—; *Uriya:* Omboroda—.

3. **Bauhinia retusa** Roxb. Hort. Beng. (1814) 31.—Plate 364.

A moderate sized tree, bark dark brown with a few vertical fissures, young shoots glabrous or nearly so. Leaves 7.5-15 cm. long, slightly broader than long, entire or notched at the tip, cordate or truncate at the base, subcoriaceous, glabrous, 9-11-nerved; petiole 3.8-9 cm. long, thickened at both ends. Flowers 1.8 cm. across, white, in lax large terminal panicles, the lower branches of which are axillary; pedicels 1.5-2 cm. long, silky-pubescent; bracts 2.5 mm. long, linear; bracteoles similar to but smaller than the bracts, close below the flower. Calyx 5-7.5 mm. long, silky-pubescent, split almost to the base into 2-3 segments. Petals twice as long as the calyx, long-

clawed, obovate, hairy outside, the 3 upper mottled with purple. Stamens 3, perfect. Ovary hairy on the edges, stipitate, the stipe adnate to the calyx-tube; style produced. Pod 10-18 by 3-3.8 cm., shortly stipitate, oblong or oblanceolate, flat, firm, late in dehiscing, red until ripe. Seeds 6-8, flat, suborbicular, dark brown, smooth.

Distribution: Sub-Himalayan tract and Outer Himalaya of the Punjab, ascending to 4,000 ft. from the Indus eastwards, Kumaon.

The gum is used as an external application to sores. It is considered as an emmenagogue and diuretic by some Indian practitioners.

Almora: Kondla—; *Garhwal:* Kandlao—; *Gond:* Thaur—; *Hindi:* Kanalla, Kandalu, Kandla, Kanlao, Kwayral, Semla—; *Kharwar:* Katman—; *Khond:* Makarokranda—; *Kolami:* Laba—; *Lohardugga:* Kaimu—; *Mundari:* Laba—; *Palamau:* Tewar—; *Punjab:* Kural—; *Reddi:* Are—; *Saora:* Are—; *Telugu:* Goddukura, Godduyare, Gondi, Nirapayamu—; *Uraon:* Twar—.

4. **Bauhinia vahlii** Wight & Arn. Prodr. (1834) 297.—Plate 365.

An immense climber with widespreading stems up to 1.2 m. girth. Bark somewhat rough, dark reddish brown or blackish. Blaze tough and fibrous, bright pink with white or yellowish bands slowly turning orange-brown on exposure. Branchlets often terminating in a pair of revolute tendrils. Young parts fulvous or rusty-tomentose. Leaves cleft 2.5-9 cm. measured from the base of the cleft to the tangent to the 2 lobes, base deeply cordate, 10-45 cm. long by about as broad, glabrescent above when mature, more or less densely tomentose beneath, base 11-15-nerved. Petiole 7.5-15 cm. long, stout, tomentose. Flowers 3.8-5 cm. across, white turning buff as they fade, in peduncled corymbose terminal densely tomentose racemes. Pedicels 2.5-6.3 cm. long. Pod 23-30 by 5-7.5 cm. flat, woody, rusty-velvety. Seeds 6-12, suborbicular, 2.5 cm. diam., flat, dark brown, polished.

Distribution: Throughout India in hilly districts.

The seed possesses tonic and aphrodisiac properties. Leaves are demulcent and mucilaginous.

Almora: Mao—; *Bengal:* Chehur—; *Bhabar:* Maldan, Maljhan—; *Canarese:* Anepadu, Anipadu: Hepparige, Kambihu—; *Central Provinces:* Mahalan, Maul, Sihar—; *Deccan:* Chambolli—; *Garhwal:* Malu—; *Gond:* Bela, Paur, Thaur—; *Gujerati:* Chembelli—; *Hindi:* Jallur, Malghan, Maljan, Maljhan, Mahul, Malo, Malu, Maulein, Maurain—; *Kharwar:* Maulan—; *Khond:* Pairmal—; *Kolami:* Lama, Rung—; *Lepcha:* Makarrik, Pegrongrik, Sungungrik—; *Malayalam:* Mottanvalli—; *Marathi:* Chambal, Chambil, Chambuli, Chambura, Charbor, Maljan—; *Mundari:* Burugungunari, Gungunari, Lamanari, Rungnari, Rurungnari—; *Nepal:* Borla—; *Punjab:* Taur—; *Reddi:* Addatige—; *Santal:* Jom—; *Saora:* Addatige—; *Tamil:* Mandarai—; *Telugu:* Adattige, Madapu, Mudupu—; *Uriya:* Shiali, Shioli, Siyali—.

5. **Bauhinia purpurea** Linn. Sp. Pl. (1753) 375.—Plate 366.

A medium sized deciduous tree, bark ashy to dark brown, nearly smooth, young parts brown-pubescent. Leaves 7.5-15 cm. long, rather longer than broad, cleft about half way down into 2 acute or rounded lobes, very minutely pubescent beneath when young, base usually cordate, 9-11-nerved; petiole 2.5-3.8 cm. long. Flowers large, rosy purple, in few-flowered terminal, brown-tomentose panicles; pedicels 5-13 mm. long, stout, tomentose; bracts and bracteoles small, tomentose, deltoid. Calyx tomentose, tube 7.5-10 mm. long, limb twice as long as the tube, usually splitting into 2 reflexed segments, 1 emarginate, the other 3-toothed. Petals 3.8-5 cm. long, oblanceolate, long-clawed, spreading, veined. Stamens usually 3 fertile, the others reduced to antherless filaments. Ovary downy, long-stalked; style long; stigma large, oblique. Pod 15-25 by 1.5-2 cm., on a tomentose stipe 1.5-2.5 cm. long, linear, flat, pointed, greenish tinged with purple till ripe, late in dehiscing. Seeds 12-15, suborbicular, flattened, 1.3 cm. diam., dark brown, smooth.

Distribution: Sparingly throughout India.—China. Often cultivated.

The root is carminative.

The bark acts as an astringent in diarrhœa. Its decoction is recommended as a useful wash in ulcers.

The flowers are laxative.

The bark or root and flowers mixed with rice water are used as a maturant for boils and abscesses.

Bengal: Devakanchan, Kanchan, Koiral, Raktakanchan—; *Bhil:* Kanchana, Kenchna—; *Bombay:* Atmatti, Devakunchun, Ragtakanchan—; *Burma:* Mahahlegani—; *Canarese:* Kempukanjivala, Kempumandara, Basavanapadu, Kanjivala, Sarul, Ulipe—; *Dehra Dun:* Khairwal—; *Garhwal:* Guira—; *Gond:* Kodwari—; *Hindi:* Gairal, Kaliar, Kandan, Kaniar, Khairwal, Koilari, Koinar, Sona—; *Khond:* Kopu, Soveri—; *Kolami:* Buruju—; *Koya:* Godetta—; *Kurku:* Koliari—; *Lepcha:* Chikung, Kachik—; *Lohardugga:* Koinar—; *Malaya:* Kundrow—; *Malayalam:* Suvannamandaram—; *Marathi:* Atmatti, Deva Kanchana, Ragta chandan, Rakta kanchan—; *Mundari:* Singara—; *Nepal:* Khwairalo, Tangki—; *Punjab:* Karalli, Karar, Koiral, Kolar—; *Reddi:* Godugura—; *Saharanpur:* Khairwalpapri—; *Sanskrit:* Raktapushpakovidara, Vanaraja—; *Santal:* Singyara—; *Saora:* Boda—; *Tagalog:* Alibanban—; *Tamil:* Kalavilaichi, Mandarai, Nilattiruvatti, Periyavatti, Segappumandarai—; *Telugu:* Bodanta, Devakanjanamu, Kanjanamu, Peddare—; *Uriya:* Boroda, Debokanjoro, Kosonaro, Sono—.

6. **Bauhinia variegata** Linn. Sp. Pl. (1753) 375.—Plate 367.

A medium sized deciduous tree, bark dark brown, nearly smooth, young shoots brown-pubescent. Leaves 10-15 cm. long, as broad as or rather broader than long, cleft $1/4$ to $1/3$ of the way down into 2 obtuse lobes, pubescent beneath when young, the pubescence persisting along and in the axils of the nerves, subcoriaceous, base usually deeply cordate, 11-15-nerved; petiole 2.5-3.8 cm. long. Flowers large, fragrant, white or purplish, appearing when the tree is leafless, in short axillary or terminal, few-flowered, grey-pubescent racemes; pedicels short or 0; bracts and bracteoles minute, tomentose, deltoid. Calyx grey-tomentose, tube slender, 1.3-2.5 cm. long, limb

spathaceous, as long as the tube, 5-toothed at the apex. Petals 5-6.3 cm. long, obovate, with long rather broad claws, all white or 4 petals pale purple and the fifth darker with dark purple veins. Stamens 5, fertile, no staminodes. Ovary pubescent along the sutures, long-stalked; style long; stigma capitate. Pod 15-30 by 1.8-2.5 cm. hard, flat, dehiscent, on a glabrous stipe 2.5 cm. long. Seeds 10-15.

Distribution: Sub-Himalayan tract and Outer Himalaya of the Punjab, ascending to 4,000 ft. from the Indus eastwards, Kumaon between 1,000—6,000 ft., Sikkim, through India proper to Burma.—China.

There are two varieties, red and white. The bark of both is alterative, tonic, astringent.—1. Red-flowered variety:—The bark is acrid, cooling, laxative, appetising, astringent to bowels in some doses; cures biliousness, "kapha" and "vata", ulcers, tuberculous glands, leprosy.—The flowers are acrid, dry, sweet; cooling, astringent, galactagogue; cure diseases of the blood, bronchitis, consumption, vaginal discharges, biliousness, headache, "tridosha".—The juice of the root is given internally in snake-bite.—. 2. White-flowered variety:—The bark is acrid, sweet; appetising, cooling, astringent to the bowels; cures biliousness, "kapha", leucoderma, anal troubles, tuberculous glands, cough, asthma, diseases of the blood, ulcers, vaginal discharges; anthelmintic; used in strangury, thirst, burning sensation (Ayurveda).

The bark is astringent to the bowels, tonic to the liver, cures bilousness, leucoderma, leprosy, dysmenorrhœa, menorrhagia impurities of the blood, tuberculous glands, asthma, wounds and ulcers; used as a gargle in stomatitis.—The buds are acrid; indigestible; used in piles, cough, eye diseases, liver complaints; astringent to the bowels, styptic in hæmaturia and menorrhagia (Yunani).

In the Konkan, the juice of the fresh bark with the juice of the flowers of *Strobilanthes citrata,* 10 tolas of each, is given as an expectorant, and the bark is used with ginger as an internal remedy for scrofula.

The root in decoction is given in dyspepsia and flatulency; the flowers with sugar as a gentle laxative; and the bark, flowers, root triturated in rice water as a cataplasm to promote suppuration. The

dried buds are used in piles and dysentery. They are considered cool and astringent, and are useful in diarrhœa and worms.

The root is prescribed in combination with other drugs for the treatment of snake-bite (Charaka, Sushruta).

The root is not an antidote to snake-venom (Mhaskar and Caius).

Almora: Keorab—; *Bengal:* Raktakanchan—; *Bhumij:* Kundol—; *Bombay:* Kanaraj, Kanchan, Kovidara—; *Burma:* Bwaycheng, Bwechin—; *Canarese:* Arisinantige, Ayata, Bilikanjivala, Irkubalitu, Kanjivala, Karalabhogi, Kempukanjivala, Kempumandara, Mandara, Ulipe—; *Central Provinces:* Kachnar—; *Dehra Dun:* Kachnar—; *French:* Arbe de saint Thomas, Bauhinie panachee—; *Hindi:* Barial, Gurial, Gwiar, Kachnar, Kandan, Kaniar, Khairwal, Khwairaal, Koliar, Kural, Padrian—; *Jaunsar:* Gariao—; *Khond:* Kopu—; *Kolami:* Singya—; *Konkani:* Kanchan—; *Kotra:* Kachnal—; *Kumaon:* Guiral, Kuiral—; *Lambadi:* Jhinjero—; *Lepcha:* Rha, Rharkung—; *Malayalam:* Kovidaram, Suvannamandaram, Unna—; *Marathi:* Kanchan, Raktakanchan, Thaur—; *Mechi:* Kurmang—; *Mundari:* Burju, Buruju—; *Nepal:* Koiralo, Taki—; *Sanskrit:* Ashmantaka, Asphota, Chamari, Chamarika, Champavidala, Gandari, Girija, Kanakaprabha, Kanchana, Kanchanala, Kanchanara, Kanchanaraka, Kantar, Karaka, Karbudara, Kovidara, Kuddala, Kuddara, Kuli, Kundali, Mahapushpa, Pakari, Raktakanchana, Raktapushpa, Shonapushpaka, Suvarnara, Svalpakkesara, Tamrapushpa, Uddalaka, Yamalachhada, Yugapatraka, Yugmapatra—; *Santal:* Jingya—; *Saora:* Boda, Rovilara—; *Tamil:* Mandarai, Segappumandarai, Semmandarai, Vellaippuvatti—; *Telugu:* Bodanta, Devakanjanamu, Kanjanamu, Mandara, Mandari—; *Urdu:* Kachnal—; *Uriya:* Boroda, Kosonaro, Kanjoni, Rongakonjono—.

7. **Bauhinia malabarica** Roxb. Hort. Beng. (1814) 31.

An erect low bushy tree, sometimes dioecious. Leaves broader than long, 3.8-12.5 by 4.5-15 cm., divided about ¼ the way down into 2 rounded lobes, glabrous above, pale and more or less pubescent

beneath, finely reticulately veined, base cordate; main nerves 7-11 (commonly 9), conspicuous; petioles 2.5 cm. long, thickened at both ends, channelled, glabrous or pubescent. Flowers in dense axillary subsessile racemes; pedicels 1.3-2.5 cm. long, slender, ascending, brown-puberulous. Calyx clothed with brown pubescence; tube 3-6 mm. long, narrowly turbinate; limb 6-8 mm. long, divided into 5 linear subacute segments. Petals obovate-spathulate, little exserted. Stamens 10, all fertile, alternately long and short. Ovary pubescent. Pods stalked, 25-30 by 2-2.5 cm., nearly straight, somewhat turgid, glabrous, conspicuously reticulately veined with longitudinal wavy lines, rostrate with the style, stalk 2.5 cm. long. Seeds 20-30, globose-ovoid, 4.5 mm. diam., dark brown, polished.

Distribution: Throughout India.

In Indo China, and in the Philippine Islands, an infusion of the new flowers is given in dysentery.

Assam: Kattra—; *Bengal:* Karmai—; *Berar:* Apta—; *Bombay:* Amli—; *Burma:* Bwaygyin, Bwegyin, Bwechin—; *Canarese:* Basavanapada, Kogele, Mandara, Nimbede, Puliko-gelepukke, Sappara, Shadhu—; *Dehra Dun:* Imli, Khattajhan-jhora, Khattajhinjhora—; *Gahrwal:* Khatua—; *Gond:* Dhondel, Kangali, Kundupula—; *Hindi:* Amli, Amlosa, Imli—; *Indo China:* Tai ty an—; *Kadir:* Kokkavali, Minpuli, Pounan—; *Kolami:* Laba—; *Kumaon:* Kachnar—; *Kurku:* Ambotha, Chapa—; *Malayalam:* Arampuli, Kokkavali, Minpuli—; *Marathi:* Korala—; *Nepal:* Amiltangki, Amli taki—; *Panpangan:* Alibangbang—; *Ramnagar:* Khatua—; *Saharanpur:* Khatpapri—; *Tagalog:* Alibangbang—; *Tamil:* Malaiyatti, Puliyatti, Vattatti—; *Telugu:* Are, Pulladanda, Pullagoddukura, Pullare, Pullaninta—; *Uriya:* Gohonoboroda—; *Visayan:* Alibangbang—.

8. **Bauhinia macrostachya** Wall. Cat. 5774.—*B. scandens* Roxb. Hort. Beng. 31; Wight Ic. t. 264 (non Linn.).

Cirrhose. Branches glabrous with copious stalked geminate tendrils. Leaves round-cordate, rigidly subcoriaceous, subglabrous, 7.5-10 cm. long with an open deltoid sinus reaching $1/6$-$1/4$ down and deltoid subacute lobes, 9-nerved, pubescence thin, grey.

Flowers in forked or simple peduncled narrow sublax racemes 7.5-15 cm. long; bracts minute, deltoid; pedicels 6-13 mm., clothed like the calyx with fine grey silky pubescence. Calyx-tube turbinate, very oblique, 6 mm.; limb campanulate 3 mm., regularly 5-cleft halfway down. Sepals deltoid. Petals much exserted, 13 mm., obovate, clawed, densely silky. Ovary densely ferrugineo-tomentose; stalk and style short. Pod ligulate, 10-15 cm. by 5 cm., flat, indehiscent, persistently tomentose, 2-4-seeded.

Distribution: Sylhet, Assam.

The plant is used in skin lesions.

Bengal: Gundagilla—.

MIMOSACEAE.

Trees or shrubs, very rarely herbs. Leaves mostly bipinnate, rarely simply pinnate. Flowers hermaphrodite, small, spicate, racemose or capitate, actinomorphic, 3-6- usually 5- merous. Calyx tubular, valvate or very rarely imbricate, 5- lobed or toothed. Petals valvate, free or connate into a short tube, mostly hypogynous. Stamens equal in number to the sepals or more numerous or indefinite, free or monadelphous; anthers small, 2-celled, opening lengthwise, often with a deciduous gland at the apex. Ovary superior. Fruit a legume. Seeds with scanty or no endosperm.—Tropical and warm regions.

Stamens definite, usually 10
I. Anthers at first gland-crested
  a. Herbs with flowers in round heads .... NEPTUNIA.
  b. Trees with flowers in round heads .... XYLIA.
  c. Shrubs or trees with flowers in spikes
    1. Climber with tendrils .... ENTADA.
    2. Erect without prickles .... ADENANTHERA.
    3. Erect, prickly
      * Pod turgid with a thick mesocarp .... PROSOPIS.
      ** Pod thin, coriaceous, finally twisted .... DICHROSTACHYS.

II. Anthers not gland-crested
  a. Stamens 10
    1. Tree with capitate stigma. Pod ligulate .... LEUCAENA.
    2. Pod jointed .... MIMOSA.
  b. Stamens indefinite
    1. Stamens free .... ACACIA.
    2. Stamens monadelphous
      Leaves bipinnate
        * Pod thin, ligulate, the sutures not thickened .... ALBIZZIA.
        ** Pod circinate .... PITHECELLOBIUM.

The members exhibit tonic and astringent, emetic, antiperiodic, and anthelmintic properties. Many yield demulcent gums.

Among the products isolated may be mentioned:—1. alcohols—benzyl—; 2. acids—tannic—; 3. esters—methyl-salicylate—; 4. aldehydes—decoic—; 5. sugars—lævulose—; 6. gums—arabic—; 7. pyrocatechol tannins—acacatechin, catechin, catechu tannic acid—; 8. alkaloids—erythrophleine—.

OFFICIAL:—*Acacia spp.* (Austria, Belgium, Denmark, France, Germany, Great Britain, Hungary, Italy, Japan, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United States); *A. Angico* Mart. (Portugal); *A. arabica* Willd. (France, Spain); *A. catechu* Willd. (Austria, France, Japan, Spain, Switzerland); *A. catechu* (Linne fil.) Willdenow (Germany, Turkey); *A. catechu* Willd.=*Mimosa Catechu* L. fil. (Italy); *A. Jurema* Mart. (Portugal); *A. Senegal* Willd. (Austria, Belgium, Denmark, France, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, United States); *A. Senegal* (Linne) Willdenow (Germany, Turkey); *A. Seyal* Delille (Spain); *A. suma* Kurz (Germany, Italy, Japan, Spain, Switzerland, Turkey); *A. tortilis* Hayne (Spain); *A. verek* Guillemin and Perrottet (Hungary, Russia).

Mimosa Catechu Linn. fil.= *Acacia Catechu* Willd. (Portugal); *M. nilotica* Linn.=*Acacia vera* Willd. (Portugal).

Pithecollobium Avaremotemo Mart.=*Mimosa cochliacarpos* Gomes, *M. vaga* Velloso (Portugal).

Stryphnodendron Barbatimao Mart.=*Mimosa Barba* Timam (Portugal).

NEPTUNIA Lour.

Herbs without prickles, diffuse, prostrate or floating. Leaves 2-pinnate; stipules membranous, obliquely cordate, persistent. Leaflets numerous, small. Flowers 5-merous, sessile, in dense heads on axillary solitary peduncles, polygamous, the upper flowers in each head hermaphrodite, the lower usually male or barren. Calyx small, campanulate, 5-toothed. Petals 5, strap-shaped, connate near the base. Stamens 10 (rarely 5), free, exserted; anthers gland-crested. Ovary stalked; ovules many; style filiform; stigma terminal, small, concave. Pod coriaceous, flattened, ligulate or oblong, 2-valved, subseptate between the seeds.—Species 10.—Tropics and subtropics.

The genus is therapeutically inert.

1. **Neptunia oleracea** Lour. Fl. Cochinch. (1790) 654.—*Mimosa natans* Roxb. Corom. Pl. t. 119.—PLATE 368.

Annual, floating; stem elongate, soft, swollen, not much branched, emitting slender fibrous roots in abundance from the leaf- and flower-bearing nodes. Leaves abruptly 2-pinnate; stipules obliquely ovate-cordate, acute; common petioles 3.2-4.5 cm. long; pinnae 2-3 pairs, opposite, shortly stalked. Leaflets 8-15 pairs, sessile, 8-13 by 2.5-3 mm., narrow-oblong, obtuse glabrous. Flowers minute, sessile, in oblong heads 1.3-1.9 cm. long, the lower flowers replaced by numerous yellow staminodes 6-8 mm. long; peduncles 7.5-15 cm. long, stout, erect, tapering, glabrous, with frequently a membranous ovate-acute bract about the middle. Calyx 1.5 mm. long, membranous; lobes acute. Corolla 3 mm. long, the lobes linear-oblong, acute. Stamens 10, much exserted; anthers gland-crested. Pods stalked, deflexed, 1.3-2.5 by 0.8 cm., slightly curved, oblique at the base, depressed between the seeds, beaked, dry, dehiscing soon by the upper suture. Seeds 6-9, obovoid-oblong, slightly compressed, 5 by 4 mm., brown.

Distribution: In tanks throughout India and Ceylon.—Tropics generally.

The plant is used as a refrigerant and astringent (Irvine).

Bengal: Panilajak, Paninajak—; *Bombay:* Panilajak—; *Malayalam:* Nittitoddavaddi—; *Patna:* Lajalu—; *Sinhalese:* Diyanidikumba—; *Tamil:* Sundaikkirai—; *Telugu:* Nidrayam, Nirutalvapu—.

XYLIA Benth.

A tall unarmed tree with hard wood. Leaves 2-pinnate. Leaflets large, of few pairs. Flowers in globose heads, mostly perfect. Calyx tubular, 5-toothed at the tip. Petals 5, valvate, slightly cohering at the base. Stamens 10, free, exserted; anthers gland-crested in an early stage. Ovary sessile; ovules many; style filiform; stigma minute, terminal. Pod large, woody flat, broadly falcate, finally dehiscent, septate between the seeds. Seeds oblong, compressed, with a short fleshy funicle.—Species 3.—Tropical Asia, Africa.

The genus is not therapeutically defined.

1. **Xylia dolabriformis** Benth. in Hook. Journ. Bot. IV (1842) 417; Bedd. Fl. Sylv. t. 186.

A tall tree; young parts tomentose. Leaves 2-pinnate; pinnae 2, terminal on a petiole 2.5-5.7 cm. long which is furnished with a gland at the apex between the pinnae. Leaflets 2-4 pairs, diminishing downwards, with often a small unopposed leaflet on the outside below the lowest pair of leaflets, the terminal leaflets 7.5-15 by 3.2-6.3 cm., the lowest pair 3.2-3.8 cm. long, all oblong, acute, with rounded base, subcoriaceous, glabrous; petiolules 2.5 mm. long. Flowers sessile, in dense globose heads 1.3-2 cm. diam.; peduncles 7.5 cm. long, slender, thickening in fruit, crowded on short puberulous branchlets developed with the young leaves. Calyx tubular, 5 mm. long; teeth 5, valvate. Corolla yellowish white, 6 mm. long; petals lanceolate, valvate. Stamens 10; filaments free, 13 mm. long, exserted; anthers crested when young with a stalked deciduous gland. Ovary sessile; ovules many. Pods 10-15 by 2.5-6.3 cm., large, woody, oblong, falcate, flat, rusty-tomentose, septate between the seeds, finally dehiscent. Seeds 6-10, oblong-ellipsoid, compressed, 13-16 by 6-10 mm., brown, smooth, polished.

Distribution: W. Peninsula, Burma, Malay Peninsula.—Indo-China, Philippines.

A decoction of the bark is used in worms, leprosy, ulcers, gonorrhœa, vomiting, and diarrhœa.

The oil from the seeds is given in rheumatism, piles, and leprosy.

Bombay: Jamba, Suria, Yerrul—; *Burma:* Pyinkado—; *Canarese:* Aravutakku, Bettadavarike, Hommavarike, Jambe, Takku, Tiruva—; *Coorg:* Sivve—; *Hindi:* Jambu—; *Kadir:* Pankali—; *Khond:* Orjori, Tangedi—; *Lambadi:* Motasalaria—; *Malayalam:* Irimpullam, Irul, Kala, Pannal—; *Marathi:* Jamba, Jambha, Suria—; *Sanskrit:* Kanakakuli—; *Saora:* Tangudu—; *Tamil:* Irul, Iruvel—; *Telugu:* Boja, Ettachennangi, Kondatangedu, Tangedumanu—; *Tulu:* Tiruve—; *Uriya:* Boja, Dhamoni, Kongora, Konokoro, Malimo, Tangini—.

ENTADA Adans.

Lofty climbing shrubs, cirrhiferous, unarmed. Leaves 2-pinnate; stipules small, setaceous. Flowers 5-merous, in long narrow spikes, minute, polygamous. Calyx campanulate, very shortly and equally 5-toothed. Petals free or slightly cohering, valvate. Stamens 10, free, shortly exserted; anthers crested with a deciduous gland. Ovary subsessile; ovules numerous; style filiform; stigma concave, terminal. Pod flat, woody, very large, composed of many discoid 1-seeded joints, the endocarp persistent round the seeds. Seeds orbicular, compressed.—Species 20.—Warm countries.

The seeds are tonic and emetic, antiperiodic and anthelmintic.

The following are used medicinally:—in Indo China, the Sunda and the Philippine Islands, in Guinea and in Brazil—*E. scandens* Benth.—; in the Martinique—*E. gigalobium* DC.—; in the Gold Coast—*E. abyssinica* Steud.—; in Southern Africa *E. natalensis* Benth., *E. scandens* Benth.—.

1. **Entada scandens** Benth. in Hook. Journ. Bot. IV (1842) 332.—PLATE 369.

An immense woody climber with a thick trunk; branches terete, glabrous. Leaves 2-pinnate; main rhachis glabrous, grooved, usually ending in a bifid tendril; petioles 5-9 cm. long, glabrous, pinnae 2-3 pairs, stalked. Leaflets 3.8-7.5 by 2-3.2 cm., oblong or obovate-oblong, obtuse, often emarginate, rigidly coriaceous, dark green,

glabrous, reticulately veined, base acute; petiolules 2.5 mm. long. Flowers in peduncled, panicled or simple spikes 15-25 cm. long, axillary or from the nodes of old leafless branches. Calyx about 1.25 mm. long, minutely 5-toothed. Corolla 2.5-3 mm. long, yellow. Pods 30-90 cm. long by 7.5-10 cm. wide and 3.8 cm. thick, slightly curved, woody, the sutures very thick, indented between the seeds. Seeds 6-15, orbicular or orbicular-oblong, 4.5-5.7 cm. diam., compressed, smooth and shining, brown. The joints of the pod break away from the thickened sutures which remain as an empty frame.

Distribution: Central and E. Himalaya, Nepal, W. Peninsula, Ceylon.—Tropics generally.

The powdered kernel, mixed with some few spices, is commonly taken by native women for some days immediately after delivery, for allaying the bodily pains and warding off cold.

The seeds are used in pains of the loins, in debility and in glandular swellings. They are given internally as an emetic.

The kernel of the seeds is employed by the Hill people as a febrifuge. In Java, employed as emetic.

An infusion of the spongy fibres of the trunk is used with advantage for various affections of the skin in the Philippines. The plant is used as a fish-poison.

The seeds, after pounding, are rubbed on aching chests by the Mundas of Chota Nagpur; and, mixed with water, are given as a drink to buffalo-calves when these get worms during the first two or three weeks.

In Indo China, the seeds are considered alexiteric, narcotic, and emetic.

In Guinea, a decoction of the bark is given internally as an astringent; the pounded leaves are applied to wounds as a vulnerary.

In South Africa, the seed is used for infants to bite during teething and also as a remedy in cerebral hæmorrhage. The roasted pod and seed are a coffee substitute, and are said to be purgative. The plant is used as a fish-poison.

Afrikaans: Seeboon—; *Ashanti:* Afirataa—; *Bengal:* Gilagach, Gilla, Pangra—; *Bombay:* Garambi, Garbi, Gardal,

Gardul, Gharbi, Pilapapra—; *Burma:* Gannyin, Gonnyin, Kongnyinnway, Kungnyen—; *Canarese:* Doddakampi, Hallekayiballi—; *Ceylon:* Elephant Creeper—; *English:* Giant's Rattle, Lady Nut, Mackay Bean—; *Ewe:* Klokpakpa—; *French:* Calibeau, Pilapara—; *Hasada:* Karrunari, Karunari, Karurunari—; *Indo China:* Day bam bam, Day tram, M'ba—; *Java:* Gandoh, Tjarijoe—; *Konkani:* Gaer—; *Lepcha:* Kulhokrik, Taktokhyem—; *Malacca:* Sintoh—; *Malayalam:* Ahakkatla, Anatata, Kakkavalli, Makkanka, Paranta, Perunkakkavalli, Vattavalli—; *Marathi:* Garambi, Garbe—; *Naguri:* Kadrunari—; *Nepal:* Pangra—; *North-Western Provinces:* Chian—; *Oudh:* Gelha—; *Pampangan:* Balogo, Bayogo, Gohongbacay—; *Punjab:* Kastorikaman—; *Sadani:* Karruphar—; *Sakalave:* Vaheabe, Vaheakarabo, Vaheamiolana—; *Sinhalese:* Puswel—; *South Africa:* Garbee Bean, Mackay Bean, Sea Bean, Solvent Stone, Swordbean—; *Sundriban:* Gila—; *Tagalog:* Bayogo, Gogo—; *Tamil:* Irikki, Sillu—; *Telugu:* Gilatige, Peddamadupu, Tikativva—; *Timor:* Weo—; *Tulu:* Palleburu—; *Uriya:* Giridi—; *Visayan:* Balogo, Balonos, Bayogo, Gohongbacay—.

ADENANTHERA Linn.

Unarmed trees. Leaves 2-pinnate. Leaflets numerous, small. Flowers usually 5-merous, in elongate spiciform racemes, axillary or panicled at the tops of the branches, usually hermaphrodite. Calyx campanulate, shortly and equally toothed. Petals valvate, cohering below the middle or at length free. Stamens 10, free, scarcely exserted; anthers crested with a deciduous gland. Ovary sessile; ovules numerous; style filiform; stigma small, terminal. Pod strap-shaped, torulose, falcate, compressed or turgid above the seeds, the coriaceous valves much twisted after they separate. Seeds small, bright coloured.—Species 5.—Tropical Asia and Australia.

A. pavonina Linn. is used medicinally in La Reunion.

1. **Adenanthera pavonina** Linn. Sp. Pl. (1753) 384; Wight Ill. t. 84.—PLATE 370.

A small unarmed tree 6-15 m. high; young parts glabrous.

Leaves 2-pinnate, 20-30 cm. long; petioles 5-10 cm. long; pinnae 3-6 pairs, opposite, 7.5-15 cm. long, with a stalk 1.3-2 cm. long, Leaflets alternate, 4-8 pairs, 2.5-3.8 by 0.8-2 cm., papery, elliptic-oblong, obtuse, glabrous, dark green above, glaucous beneath, base shortly cuneate, unequal-sided; petiolules 3 mm. long. Flowers in short-peduncled racemes 5-15 cm. long, axillary or panicled at the ends of the branches; pedicels 2.5-3 mm. long, slender. Calyx minute; lobes short, triangular. Corolla pale yellow, about 3 mm. long; segments united at the base only, linear-lanceolate, acute, valvate. Stamens 10, free, hardly exserted; anthers gland-crested. Pods 15-23 by 1.6-2 cm., flat, falcately curved, pointed, tapering to the base, the valves spirally twisted after dehiscence. Seeds 8-15, lenticular-globose, with a blunt keel, smooth, shining, usually brilliant scarlet, 8 mm. diam.

Distribution: Bengal, Burma, W. Peninsula, Ceylon.—Malay Islands, Timor, China, Philippines.

The powdered seeds make a useful external application hastening suppuration.

A decoction is made from the leaves in South India, and given as a remedy for chronic rheumatism and gout. If used for any length of time, it is said to be an aphrodisiac. This decoction is said to be useful in hæmorrhage from the bowels and hæmaturia.

In La Reunion, the plant is considered astringent. It is used for rheumatism and sore throat.

The seeds yield about 14 per cent of an oil which contains 25 per cent of lignoceric acid. The oil has been chemically examined by Mudbidri, Ramaswamiayyar, and Watson (*Journ. Ind. Inst. Sc.;* XI, 1928).

Andamans: Recheda—; *Assam:* Chandan—; *Bengal:* Ranjana, Raktakambal, Raktakanchan—; *Burma:* Ywaygyee, Ywegyi—; *Canarese:* Manjadi, Manjatti, Munjuti—; *Ceylon:* Bead Tree—; *Deccan:* Barigumchi, Hattigumchi—; *English:* Red Wood—; *French:* Bois de bouclier, Condori, Condori commun, Condori crête de paon, Condori glabre, Crête de paon—; *Gold Coast:* Bead Tree, Peacock Tree, Red Sandalwood—; *Gujerati:* Badigumchi,

Barigumchi, Hattigumchi, Ratanjali, Rataval—; *Hindi:* Barigumchi, Raktachandana—; *Konkani:* Odlygunji—; *La Reunion:* Bois noir rouge—; *Magahi:* Gung—; *Malay:* Kanduri batang, Saga—; *Malayalam:* Manjati, Sem—; *Marathi:* Thorlagunj, Thorligunj, Val—; *Philippines:* Alalangat—; *Porebunder:* Ratanjali, Rataval—; *Sanskrit:* Ksharaka, Kusandana, Ranjaka, Tamraka—; *Santal:* Birmungara—; *Seychelles:* Agati—; *Sinhalese:* Madateya—; *Tagalog:* Bahay, Quinasaicasay—; *Tamil:* Anaikundimani, Manjadi, Sem, Tilagam, Tilam—; *Telugu:* Bandigurivenda, Bandiguruginja, Enugaguruginji, Gurivenda, Peddaguriginja—; *Uriya:* Sokakainjo—; *Visayan:* Bahay, Baguiroro, Casay—.

PROSOPIS Linn.

Erect prickly trees or shrubs. Leaves 2-pinnate; stipules small or 0. Leaflets small, narrow. Flowers 5-merous, usually sessile, in narrow spikes or subspicate racemes. Calyx campanulate, shortly toothed or subentire. Petals connate below the middle or at length free, valvate. Stamens 10, free, shortly exserted; anthers crested with a deciduous gland. Ovary sessile or stalked; ovules many; style filiform; stigma minute, terminal. Pod turgid, cylindric or oblong, straight, falcate or variously twisted, septate between the seeds; mesocarp thick, spongy. Seeds usually ovoid, compressed.—Species 30.—Tropics and subtropics.

P. alba Linn. is used medicinally in South America.

1. **Prosopis spicigera** Linn. Mant. (1767) 68; Roxb. Corom. Pl. t. 63; Brandis For. Fl. t. 25.—PLATE 371.

A tree, 9-18 m. high, sending its roots many feet into the ground; branches slender, glabrous, armed with nearly straight, scattered, somewhat compressed prickles 3-6 mm. long (very rarely unarmed). Leaves 2-pinnate; main rhachis glabrous or puberulous; pinnae usually 2 pairs, opposite, 2.5-7.5 cm. long, often with round insect-galls on their rhachises. Leaflets 7-12 pairs, 10-16 by 3-4.5 mm., subsessile, oblong, obliquely rounded and mucronate at the apex, very unequal-sided, the upper side much the smaller, reticulately

veined, grey, glabrous, base rounded and very oblique. Flowers sessile or nearly so, in short-peduncled axillary spikes and terminal panicles; bracts small, membranous. Calyx 1.5 mm. long, membranous, cup-shaped, faintly 5-toothed or truncate. Corolla yellow, 3 mm. long. Pods 10-20 cm. long, turgid, straight, slender, cylindric, torulose, glabrous, narrowed gradually into a short stalk and filled with a brown farinaceous edible substance. Seeds 10-15, dull brown, oblong.

Distribution: Punjab, Rajputana, Bundelkhand, Baluchistan, Sind, Gujarat.—Afghanistan, Persia.

The bark is dry, acrid, bitter, with a sharp taste; cooling, anthelmintic, tonic; cures leprosy, dysentery, bronchitis, asthma, leucoderma, piles, tremors of the muscles, wandering of the mind. —The smoke of the leaves is good for eye troubles.—The fruit is dry and hot, with a flavour; indigestible, causes biliousness, destroys the nails and the hair (Ayurveda).

The pod is considered astringent in the Punjab.

The bark is used in the Central Provinces as a remedy for rheumatism.

At Saruma, in Jhalawan, the flowers are pounded and mixed with sugar, and eaten by women during pregnancy to safeguard them against miscarriage. In Las Bela, the ashes are rubbed over the skin to remove hair (Hughes-Buller).

The plant is recommended for the treatment of snake-bite (Sushruta, Yogaratnakara). The bark is prescribed for scorpion-sting (Sushruta).

All parts of the plant are equally useless in the treatment of snake-bite (Mhaskar and Caius). The bark is not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Shami, Somi—; *Bombay:* Saundad, Shami, Shamri, Shemi, Shemri, Shemu, Sounder, Sumri—; *Canarese:* Banni—; *Central Provinces:* Kandi, Shumi—; *Cutch:* Kando, Samari—; *Deccan:* Saunder, Savandal, Soundar—; *Gujerati:* Hamra, Kando, Khijado, Khijro, Sami, Semru, Sumri—; *Hindi:* Chhikura, Chhokara, Chhonkara, Jand, Jhand, Safedkikara, Sami—; *Kathiawar:* Khijadi—;

Konkani: Shami, Shemi, Xembi—; *Lambadi:* Khagara—; *Las Bela:* Kanda, Kando, Hajeru—; *Malayalam:* Parampu, Vanni—; *Marathi:* Saunder, Savandal, Shemi—; *Nasirabad:* Kandi—; *North-Western Provinces:* Chaunkra—; *Porebunder:* Khijado—; *Punjab:* Jand, Jandi, Jant, Jhand, Kanda, Kandi, Khunda, Khar, Seh—; *Pushtu:* Aghzakai, Aghzakar, Kandi—; *Rajputana:* Kajra, Khejra, Sangri, Se—; *Sanskrit:* Bhadra, Duritadamani, Havirgandha, Ishana, Ishani, Ishta, Kachariphala, Kananari, Keshahantra, Keshamathani, Lakshmi, Mangalya, Medhya, Papanashini, Papashamani, Pavitra, Saktuphala, Samira, Samudra, Shaktuphali, Shami, Shankari, Shankuphalika, Shanta, Shiva, Shivaphala, Shubhada, Shubhadra, Shubhakari, Sukhada, Supatra, Surabhi, Tapanatanaya, Tunga, Vanhigarbha—; *Saruna:* Mar—; *Sibi:* Kandi—; *Sind:* Kandi, Kemdo, Kundi—; *Tamil:* Jambu, Kalisam, Kulisam, Parambai, Sami, Siva, Tamali, Vanni—; *Telugu:* Jambi, Jammi, Priyadarsini—; *Turbat:* Kahur—; *Uriya:* Khodiro, Somi—.

DICHROSTACHYS, Wight & Arn.

Shrubs. Leaves 2-pinnate. Leaflets usually small, multijugate. Flowers 5-merous, minute, polygamous, in solitary or twin peduncled spikes, perfect in the upper half of the spike, those of the lower half bearing long filiform staminodes. Calyx campanulate, shortly toothed. Petals cohering below the middle, valvate. Stamens in the hermaphrodite flowers 10, free, shortly exserted; anthers gland-crested. Ovary subsessile; ovules many; style filiform; stigma terminal, truncate. Pod linear, compressed, twisted up when ripe, continuous within, indehiscent or the valves separating irregularly from the sutures. Seeds obovoid, compressed.—Species 10.—Warm regions of Old World.

D. tenuifolia Benth. is used medicinally in Madagascar, *D. nutans* Benth. in East Africa.

1. **Dichrostachys cinerea** Wight & Arn. Prodr. (1834) 271; Roxb. Corom. Pl. t. 174; Bedd. Fl. Sylv. t. 185.—PLATE 372.

A much-branched thorny shrub, sometimes a small tree; bark light coloured, furrowed; branchlets ending in spines. Leaves

2-pinnate, 3.2-6.3 cm. long; main rhachis more or less softly pubescent, with a small erect gland between each pair of pinnae; stipules 4.5 mm. long, subulate from a triangular base; pinnae 8-14 pairs, 1-1.6 cm. long, sessile or nearly so. Leaflets minute, sessile, 12-20 pairs, close, linear, oblique, subacute. Flowers numerous, crowded in dense axillary or extraaxillary spikes 2.5-3.8 cm. long, the upper half of the spike yellow, the lower red. Calyx 0.8 mm. long, membranous. Corolla 2-2.5 mm. long. Stamens of the perfect flowers in the upper half of the spike yellow. Staminodes in the lower half of the spike 1.3 cm. long, much longer than the stamens, red. Pods 5-7.5 by 0.6-1 cm., glabrous, flat, subarticulated, dark brown, twisted up when ripe. Seeds 6-10.

Distribution: N.-W. India, Central India, Rajputana, Deccan, S. M. Country, N. Kanara to Ceylon.—Malay Islands, N. Australia.

The root is hot, bitter; wholesome; improves the appetite; astringent to the bowels; cures rheumatism, strangury, urinary calculi and renal troubles, diseases of the vagina and uterus, retention of urine, pain in the joints (Ayurveda).

The young shoots are bruised and applied to the eyes in cases of ophthalmia.

Ajmere: Kheri—; *Bombay:* Vurtuli—; *Burma:* Sitbyu—; *Canarese:* Odatare, Odavare, Odavinaha, Wadu—; *Ceylon:* Vidattal—; *Gond:* Segumkati—; *Gujerati:* Marud—; *Hindi:* Kheri, Vartuli—; *Lambadi:* Banutula—; *Marathi:* Segumkati, Sigamkati—; *Merwara:* Kanlai, Kheri, Kunlai—; *Panch Mahals:* Vellantaro—; *Porebunder:* Mordundiyun—; *Rajputana:* Khen—; *Sanskrit:* Bahuvaraka, Dirghamula, Krichhari, Kshudhakushalasandnaka, Mahakapitha, Vallataru, Vellantaru, Viradru, Viravriksha—; *Sinhalese:* Andara—; *Tamil:* Anatter, Mavilandam, Vadataram, Varittula, Veduttalam, Vidattalai, Vidatter—; *Telugu:* Nallavenuturu, Nellajammi, Samiramu, Saratumma, Veluturu, Venuturu—; *Uriya:* Khoiridya—.

LEUCAENA Benth.

Unarmed trees or shrubs. Leaves 2-pinnate; stipules setaceous or small. Flowers 5-merous, sessile, usually hermaphrodite, in

globose heads; peduncles axillary, subfasciculate, or the upper arranged in a terminal leafless raceme; bracts usually 2. Calyx tubulose-campanulate, shortly toothed. Petals free or nearly so, valvate. Stamens 10, free, much exserted; anthers not gland-crested. Ovary stalked; ovules many; style filiform; stigma small, terminal. Pod stalked, strap-shaped, flat, coriaceous, continuous within, dehiscent. Seeds transverse, ovoid, compressed.—Species 12.—Warm America, Polynesia.

This genus is therapeutically inert.

1. **Leucaena glauca** Benth. in Hook. Journ. Bot. IV (1842) 416.

A large erect shrub or small tree 1.8-6 m. high, unarmed. Leaves 2-pinnate, 7.5-18 cm. long; main rhachis slender, channelled, pubescent, ending in a weak spine; petioles 2.5-5 cm. long; pinnae 3-6 pairs, 5-9 cm. long, shortly stalked, their rhachises pubescent, ending in a weak spine. Leaflets 10-15 pairs, rather distant, 10 by 3 mm., membranous, glaucous, linear-oblong, acute, glabrous or nearly so above, finely pubescent beneath, base oblique. Flowers in dense globose heads; peduncles often germinate, 2.5-3.8 cm. long, slender, pubescent, elongate and slightly thickened in fruit. Calyx 2.5-3 mm. long, tubulose-campanulate, membranous; teeth short, triangular. Petals 4 mm. long, spathulate-oblong, indurated at the tip, whitish. Stamens 10, much exserted; anthers not gland-crested. Ovary shortly stalked, slightly pubescent. Pods 12.5-15 by 1.3-2 cm., straight, flat, obliquely triangular at the apex, narrowed at the base into a stalk 6-13 mm. long, glabrous. Seeds 15-20.

Distribution: A native of tropical America.—Naturalized more or less throughout India.

In Assam, the bark is eaten for internal pain (Carter).

Ceylon: Horse-tamarind, Wild-tamarind—; *Gujerati:* Lasobaval, Pardeshibaval, Vilayatibaval—; *Lakhimpur:* Toriakadam—; *La Reunion:* Cassie blanc, Gros cassie, Mimosa—; *Malay:* Petai jawa—; *New Caledonia:* Acacia—; *Philippines:* Santa Helena—; *Visayan:* Agho—.

MIMOSA Linn.

Herbs, shrubs, or small trees with or without prickles. Leaves 2-pinnate. Leaflets small, usually sensitive. Flowers polygamous, minute in dense globose heads or cylindric spikes, often tetramerous; peduncles axillary, solitary or fascicled, the upper often forming a raceme. Calyx usually minute, almost inconspicuous. Petals more or less connate, valvate. Stamens equal in number to the petals or twice as many, free, exserted; anthers small, not gland-crested. Ovary sessile or stalked; ovules many; style filiform; stigma small, terminal. Pods flat, made up of 1-seeded joints that separate when ripe from the persistent sutures. Seeds ovoid or orbicular, flat.—Species 400. —Tropical and subtropical America, a few in Africa and Asia.

1. Pinnae of the leaves 1-2 pairs .... 1. *M. pudica.*
2. Pinnae of the leaves more than 2 pairs .... 2. *M. rubicaulis.*

M. pudica Linn. is used medicinally in Cambodia, the Gold Coast, Brazil, and in the Islands of La Reunion, Madagascar, and Martinique.

The wood of *M. Catechu* Linn. fil. (*Acacia Catechu* Willd), and the gum of *M. nilotica* Linn. (*Acacia vera* Willd) are official in Portugal.

1. **Mimosa pudica** Linn. Sp. Pl. (1753) 518.—PLATE 373B.

A diffuse undershrub 45-90 cm. high; stems and branches sparingly prickly and clothed with long weak bristles from bulbous bases. Leaves sensitive, digitate; petioles 2.5-5 cm. long, bristly; stipules 8 mm. long, linear-lanceolate, acute, bristly; pinnae 1-2 pairs, 5-7.5 cm. long, sessile or nearly so, their rhachises clothed with ascending bristles. Leaflets 12-20 pairs, 6-8 by 4 mm., sessile, coriaceous, linear-oblong, acute, glabrous above, clothed with appressed bristles beneath, base obliquely rounded. Flowers 4-merous, pink, in globose heads, 6-8 mm. diam.; peduncles 2-2.5 cm. long, prickly, usually in axillary pairs all along the branches; bracteole solitary, linear, acute, ciliolate. Calyx very minute. Corolla pink, 2-2.5 mm. long, divided about $^1/_3$ the way down; lobes 4, ovate-oblong, obtuse. Stamens 4, much exserted; anthers not gland-crested. Pods 1.3-2 cm. by 3-4 mm., flat, slightly recurved,

consisting of 3-5 1-seeded joints which fall away from the persistent sutures which are clothed with spreading yellowish weak bristles 3 mm. long, the faces of the pods glabrous.

Distribution: Probably a native of tropical America; naturalized more or less throughout India.

The root is bitter and acrid; cooling, vulnerary, alexipharmic; cures "kapha", biliousness, leprosy, dysentery, vaginal and uterine complaints, inflammations, burning sensation, fatigue, asthma, leucoderma, diseases of the blood (Ayurveda).

The root is resolvent, alterative; useful in diseases arising from corrupted blood and bile, bilious fevers, piles, jaundice, leprosy, ulcers, smallpox (Yunani).

A decoction of the root of this plant is considered on the Malabar Coast to be useful in gravellish complaints. The Vytians of the Coromandel side of India prescribe the leaves and root in cases of piles and fistula; the first are given in powder, in a little milk, to the quantity of two pagodas weight or more during the day.

In the Konkan, the leaves are rubbed into a paste and applied to hydrocele; and their juice, with an equal quantity of horses' urine, is made into an anjan, used to remove films of the conjunctiva by setting up an artificial inflammation.

The juice of the leaves is used to impregnate cotton wool for a dressing, in any form of sinus.

In the Gold Coast, the leaves are used as a medicine for Guinea-worm.

In La Reunion and Madagascar, the plant is considered diuretic, astringent, antispasmodic. It is much used for convulsions in children.

In the Martinique, the roots are considered irritant, and toxic in higher doses; the seeds are used as an effective emetic; an infusion of the leaves is given as a bitter tonic.

In Guiana, the leaves are used as a powerful sudorific; a light infusion is given as a bitter tonic. The seeds are used as an emetic, and the root as an emetic; the latter is irritant, and even toxic in large doses.

In Brazil, the root is used as an emetic; the leaves are given in scrofula.

The leaf and stem in combination with other drugs are recommended for the treatment of snake-bite (Bhavaprakasha, Rasaratnakara, Yogaratnakara) and scorpion-sting (Rasaratnakara, Vaidyavinoda).

The whole plant is used medicinally in Cambodia. Internally it is prescribed for vesical calculi. Externally it is used in œdema, rheumatism, myalgia, and tumour of the uterus.

The leaf and stem are not an antidote to either snake- (Mhaskar and Caius) or scorpion- (Caius and Mhaskar) venoms.

Awuna: Awadzor—; *Bengal:* Lajak, Lajjabate—; *Betsimisaraka:* Anakoay, Anankoay, Matirosana, Rohitra—; *Burma:* Htekayung, Takayung—; *Cambodia:* Preah Khlop—; *Canarese:* Hadergitte, Lajja, Mudugudavara, Muthamurike, Nasike—; *Catalan:* Sensitiva—; *English:* Humble Plant, Sensitive Plant—; *Ewe:* Awadzor, Srorwo gborna miata—; *Fanti:* Efumuano—; *French:* Herbe chaste, Herbe pudigue, Herbe vivante, Mimeuse, Sensitive—; *French Guiana:* Sensitive épineuse—; *Ga:* Oshayo mba—; *Gujerati:* Lajalu, Risamani—; *Hindi:* Lajalu, Lajjavati, Lajwanti, Sharmpate—; *Hova:* Amboafotsikely—; *Indo China:* Ham tu thao, Mat co—; *Italian:* Vergognosa—; *Kumaon:* Lajwanti—; *La Reunion:* Sensitive, Trompe la mort—; *Madras:* Tottarsinungi—; *Malayalam:* Tintarmani, Tottavati—; *Marathi:* Lajalu, Lajri—; *Mundari:* Durumjanum, Japidjanum, Lajauni—; *Nasirabad:* Sharambuti—; *Nepal:* Bohorijhar, Lajania—; *Punjab:* Lajwanti—; *Pushtu:* Zhand—; *Sanskrit:* Anjalikaraka, Anjalikarika, Asrarodhani, Gandamalika, Kandiri, Khadiraka, Khadirpatrika, Lajja, Lajjalu, Lajjika, Mahabhita, Mahaushadhi, Mamaskari, Prasarini, Raktamula, Raktapadi, Samanga, Sankochini, Saptaparni, Shamipatra, Sparshalajja, Sprikha, Svagupta, Tamra, Tamramula, Vashini—; *Spanish:* Matavirgen, Mirame y no me toques, Sensitiva, Vergonzosa—; *Tagalog:* Damohiya, Macahiya—; *Tamil:* Kasirorttam, Samangai, Tottachurungi, Tottalvadi—; *Telugu:* Peddanidrakanti—; *Tulu:* Nasikedai—; *Twi:* Kata wani na w'osew reba, Mumuankang—; *Urdu:* Lajjalu—; *Uriya:* Dedhasurobarasuni, Najuko—.

2. **Mimosa rubicaulis** Lam. Encycl. Méth. I (1783) 20.—Plate 373A.

A large straggling deciduous shrub, branches long and little branched, striate, more or less pubescent. Prickles usually numerous straight or hooked, 2.5 mm. long or less. Rhachis 10-23 cm. long, usually very prickly. Pinnae 5-12 pairs, 2.5-6.3 cm. long. Leaflets 6-15 pairs, 3.8-7.5 by 2-3 mm., oblong, obtuse, mucronate, the midrib excentric, glabrous above, paler and more or less pubescent beneath, ciliate; petiolules minute. Flowers pink fading to white, tetramerous, in globose pedunculate heads 1.25-1.5 cm. diam.; peduncles 2.5-5 cm. long, pubescent in axillary fascicles forming large terminal leafy panicles. Flowers minutely pedicelled in the axil of a small, linear-spathulate, ciliate bract. Calyx minute, ciliolate. Corolla 3 mm. long, cleft $^1/_3$ the way down. Stamens 8. Ovary shortly stipitate, glabrous. Pods 7.5-10 by 1 cm., flat, falcate, glabrous, joints 4-10, square, sutures not prickly.

Distribution: Throughout India.—Afghanistan.

In Chamba, the bruised leaves are applied to burns. The fruit is also used medicinally.

In the North-Western parts of India, the leaves are prescribed as an infusion for piles.

In Chota Nagpur, the powdered root is given when from weakness the patient vomits his food; the fruit and leaves are also used medicinally.

Bengal: Kuchikanta, Shiahkanta—; *Canarese:* Rasne, Urisige—; *Garhwal:* Khinkari—; *Hindi:* Agla, Aila, Alral, Eil, Shiahkanta—; *Khond:* Shikeri—; *Malayalam:* Kattusinikka—; *Mundari:* Araijanum, Kundurujanum—; *North-Western Provinces:* Agla, Kingli, Kingrei—; *Punjab:* Alla, Arlu, Didriar, Kikkri, Ral, Riaul—; *Rajputana:* Alla—; *Ramnagar:* Khinkari—; *Santal:* Segajanum—; *Sind:* Hajero, Hajeru, Hujiru—; *Tamil:* Igai, Ikkagodi, Indai, Indangodi, Indu, Ingu, Ingai, Iraittu, Karindu, Karunjundi, Karruppuyindiriyakkodi, Kattuchiyakkay, Kundai, Nakkiyakkiram, Sevvindu, Singili, Tulobam, Tuppirasam—;

Telugu: Kodimudusu, Korinda, Putakorinda, Sandratige, Undra, Vallikatura, Ventra—; *Uriya:* Dontari, Rasna—.

ACACIA (Tourn.) Linn.

Trees or shrubs erect or climbing, usually armed. Leaves 2-pinnate; stipules spinescent or inconspicuous, rarely membranous. Leaflets usually small, multijugate or reduced to a leaf-like petiole (phyllode). Flowers small, hermaphrodite or polygamous, usually 5-merous, in globose heads or cylindric spikes; peduncles axillary solitary or fascicled or panicled at the ends of the branches. Calyx campanulate or funnel-shaped, shortly toothed. Petals exserted, more or less united, rarely free. Stamens indefinite, much exserted, free; anthers small, not gland-crested. Ovary sessile or stalked; ovules many; style filiform; stigma small, terminal. Pod ligulate or oblong, not jointed, usually compressed and dry, dehiscent or indehiscent, rarely turgid and subcylindric, the sutures straight or wavy, not thickened.—Species 550.—Tropics and subtropics.

A. Erect shrubs or trees. Spines long and straight. Stipules spinescent. Flowers in round heads		
1. Pinnae 8-16. Leaflets 20-40	1.	*A. farnesiana.*
2. Pinnae 6-12. Leaflets 20-40	2.	*A. arabica.*
3. Pinnae 12-24. Leaflets 30-60	3.	*A. leucophloea.*
B. Erect trees. Spines short and hooked. Stipules spinescent. Flowers in peduncled spikes in the axils of the leaves		
1. Pinnae 20-40. Leaflets 60-100	11.	*A. suma.*
2. Pinnae 40-80. Leaflets 60-100	4.	*A. catechu.*
3. Pinnae 6-12. Leaflets 20-40	5.	*A. ferruginea.*
4. Pinnae 6-10. Leaflets 16-28	6.	*A. senegal.*
5. Pinnae 4-6. Leaflets 6-8	7.	*A. modesta.*
C. Climbers with copious scattered prickles. Flowers in copiously panicled globose heads		
1. Pinnae 12-16. Leaflets 30-50	8.	*A. rugata.*
2. Pinnae 12-16. Leaflets 16-24	9.	*A. caesia.*
3. Pinnae 16-30. Leaflets 80-100	10.	*A. pennata.*

The bark is generally a powerful astringent and tonic. Most species yield gum which is used as a demulcent.

The following are used medicinally:—in Indo China A. *concinna* DC., *A. farnesiana* Willd., *A. pennata* Willd.—; in China—*A. richii* A. Gray—; in the Philippine Islands—*A. farnesiana* Willd.—; in

nodes slender, terete, pubescent, with a ring of small deflexed ciliate bracts at or near the apex; bracteole solitary, deltoid, on a long slender stalk, ciliolate. Calyx 1.5 mm. long, membranous; teeth short, triangular, acute. Corolla 2.5 mm. long; lobes very short, obtuse. Ovary glabrous. Pods 5-9 by 1.3 cm., subcylindric, turgid, slightly curved, conspicuously striately veined, glabrous, brown; mesocarp pulpy. Seeds biseriate.

Distribution: Cosmopolitan in the tropics, often planted.

The bark is acrid and hot; alexiteric, anthelmintic, antidysenteric; cures stomatitis, caries of the teeth, diseases of the blood, itching, bronchitis, leucoderma, ulcers, inflammations, erysipelas.—The gum is sweetish; tonic, aphrodisiac (Ayurveda).

The bark is astringent and used in the form of a decoction.

The tender leaves, bruised in a little water, are swallowed for the treatment of gonorrhœa.

In the Philippine Islands, a decoction of the astringent stem bark is given for prolapsus ani and leucorrhœa. The tender leaves are boiled and applied as a cataplasm to wounds and ulcers which have previously been washed with a decoction of the same leaves.

The plant is one of the ingredients in Sushruta's "ksharagada", a preparation for the treatment of snake-bite.

The plant is not an antidote to snake-poison (Mhaskar and Caius).

Bengal: Guyababula—; *Bombay:* Deobabul, Gukikar, Vilayatibabul—; *Burma:* Nanlonkyaing, Huanlongyaing—*Canarese:* Jali, Kasturigobbali, Kasturijali, Kirijali, Sannajali—; *Deccan:* Gand babul, Guh babul, Gu kikar, Pissi babul, Vilayati babul, Vilayati kikar—; *English:* Cassie Flowers, Sponge Tree, Stinking Acacia—; *French:* Acacia de Farnĕse, Acacia odorante, Bois d' acacia, Bois caca, Bois de marde, Cacie, Cassie—; *Gujerati:* Gandhelokhair, Jheribaval, Talbaval—; *Hasada:* Barangudara—; *Hindi:* Durgandhakhair, Gandbabul, Guhbabul, Gukikar, Pissibabul, Vilayatibabul, Vilayatikikar—; *Indo China:* Keo ta, Kinh cau hoa, Kou kong, Kum tai, Man coi, Sambor meas—; *Italian:* Gaggia—; *La Reunion:* Cassie, Cassie jaune, Epinard—;

Malay: Lasana—; *Malayalam:* Pivelam—; *Marathi:* Gubabul, Guyababul, Kankri, Yeribabul—; *Naguri:* Bangurdaru—; *Sanskrit:* Arimeda, Arimedaka, Asimeda, Girimeda, Godhaskanda, Irimeda, Kalaskandha, Krimishatrava, Marudruma, Rimeda, Vita, Vitkhadira—; *Santal:* Gabur—; *Shah Bilawul:* Baver—; *Sind:* Knebawal—; *Spanish:* Aromo—; *Tagalog:* Aroma, Roma—; *Tamil:* Kadivel, Kasturivel, Pivel, Vedumul, Veduvali—; *Telugu:* Arimdamu, Kamputumma, Kasturitumma, Murikitumma, Nagatumma, Piketumma, Piyyatumma—; *Uriya:* Gudoyaboburo, Gonddhoguanria—; *Visayan:* Santiago—.

2. **Acacia arabica** Willd. Sp. Pl. IV (1805) 1085.—Plate 375.

A small tree with dark brown or black longitudinally fissured bark; branchlets slender, terete, pubescent when young. Leaves 2-pinnate, 5-10 cm. long; main rhachis downy, often furnished with glands; petioles 2.5-5 cm. long; stipular spines very variable, 0.6-5 cm. long, smooth, usually whitish, straight, sharp, often absent; pinnae 4-9 pairs, 2-5 cm. long, shortly stalked. Leaflets subsessile, 10-25 pairs, 3-6 by 1.2-2 mm. linear-oblong, subobtuse, glabrous or nearly so. Flowers yellow, in globose heads; peduncles axillary, in fascicles of 2-6, terete, pubescent; bracteoles 2, above the middle of the peduncle, broadly ovate, acute, pubescent. Calyx campanulate, 1.25 mm. long; teeth very short. Corolla 3 mm. long; lobes short, triangular. Pods stalked, 7.5-15 by 1.3-1.6 cm., monoliform, compressed, constricted at the sutures between the seeds, densely and persistently grey downy. Seeds 8-12.

Distribution: Throughout the greater part of India, Ceylon, Baluchistan, Waziristan.—Arabia, Egypt, tropical Africa, Natal.

The bark is acrid and hot; astringent to the bowels, alexipharmic, anthelmintic; cures cough, bronchitis, diarrhœa, dysentery, biliousness, burning sensation, piles, leucoderma, urinary discharges; good in ascites.—The leaves are astringent to the bowels; cure bronchitis, "vata", piles; heal fractures; good for diseases of the eye.—The fruit is dry, acrid, sweet; cooling, astringent to the bowels; cures "kapha" and biliousness.—The gum is astringent to the bowels,

antidysenteric, styptic; cures biliousness, leprosy, urinary discharges, vaginal and uterine discharges; heals fractures (Ayurveda).

The bark is bitter acrid, with a slightly bad flavour, astringent to the bowels, emetic; lessens dyspnoea; exhibits the same properties as the leaves.—The leaves are astringent, tonic to the liver and the brain, antipyretic; cure leucoderma, gonorrhœa, strangury; enrich the blood; used in urethral discharges, ophthalmia, and eye sores.—The flowers are a powerful tonic; a good cure for insanity.—The gum is sweetish; expectorant, tonic to the liver, antipyretic; cures sore throat, lung troubles, cough, piles, burns; enriches the blood; used in colic.—All parts of the plant are aphrodisiac (Yunani).

The bark is a powerful astringent and demulcent. It may be used as a substitute for oak galls. It has been found a valuable remedy in prolapsus ani, as an external applicant in leucorrhœa and has been recommended as a poultice for ulcers, attended with sanious discharge.

The tender leaves beaten into a pulp, are given in diarrhœa as an astringent.

In Rajputana, the bruised leaves are applied to sore eyes in children (Blatter).

The gum is said to be very useful in diabetes mellitus.

In the Konkan, a strengthening sweetmeat is made by frying the gum, with spices and butter, and making it into balls with sugar. In bloody seminal discharges, 1 tola of the young leaves with 4 mashas of cumin and 2 tolas of sugar are eaten or given as a draught beaten up with milk.

In Guinea, the gum resin is used for troubles of the throat and the chest. The fruits are prescribed in dysentery and ophthalmia.

In case of snake-bite the powdered bark is dusted over the bitten part.

The powdered bark dusted over the bitten part has no effect in the treatment of snake-bite (Mhaskar and Caius).

Arabic: Ummughilan—; *Bambara:* Bagana, Barana, Bona, Buana—; *Bariba:* Bani—; *Bengal:* Babla, Babul, Babur, Kikar—; *Bombay:* Babhula, Kalikikar, Kikar, Ramakali, Ramkanti—; *Burma:* Huanlongkyain—; *Canarese:* Babbuli, Bobbuli, Barbara, Barbura,

Gobbali, Jali, Karibela, Karigi, Karijali, Ramakanti—; *Central Provinces:* Babul—; *Dahomey:* Abadonui—; *Egypt:* Sant, Sunt—; *English:* Black Babool, Indian Gum Arabic Tree—; *French:* Bois d' arariba rose, Bois diabubul, Gommier des Indes, Gommier rouge—; *Fulah:* Bara Na—; *Fulbe:* Siludi—; *Greek:* Kommi—; *Gujerati:* Babalia, Baval—; *Gurma:* Kudatregon—; *Hausa:* Bagaruwa—; *Hebrew:* Shittim—; *Hindi:* Babla, Babul, Babur, Kikar—; *Jubbulpore:* Bamura—; *Kano:* Bagaruwa—; *Konkani:* Babul—; *Kumaon:* Babul—; *Lambadi:* Bambolero—; *Malaya:* Babola—; *Malayalam:* Karuvelakam, Karuvelam—; *Malinke:* Bagana, Barana, Bona, Buana, Sahe—; *Marathi:* Babhul, Babul, Vedibabul—; *Marke:* Sake—; *Mauritania:* Amur—; *Mundari:* Babla, Gubuldaru, Guguldaru—; *Mysore:* Gobli, Karijali—; *Nasirabad:* Babur—; *Persian:* Kharemughilan—; *Peuhl:* Gaodi, Gaude, Gaudi—; *Porebunder:* Baval, Jachobaval, Kalobaval, Mithobaval, Sachobaval, Vadobaval—; *Portuguese:* Gomma da India—; *Punjab:* Babla, Babul, Babur, Kikar—; *Rindli:* Kikar—; *Sadani:* Babul—; *Sahara:* Amura—; *Saharanpur:* Kikar—; *Sanskrit:* Ajabaksha, Babbula, Babbulaka, Babula, Barbura, Burbura, Dirghakantaka, Dridhabija, Dridharuha, Goshringa, Kantalu, Kaphantaka, Kashaya, Kashtaki, Kinkirata, Malaphala, Panktibija, Pitaka, Pitapushpa, Sukshmapatra, Svarnapushpa, Tikshnakantaka, Varvara, Vavvola, Yugalaksha, Yugmakanta—; *Santal:* Gabur—; *Sarakolet:* Diabbe—; *Sibi:* Babur—; *Sind:* Babbar, Babhula, Kalikikar—; *Sokoto:* Bagaruwa—; *Surai:* Bani, Baniga, Corgui, Corre—; *Tamil:* Iramangandam, Karuvel, Karuvelam, Vel—; *Telugu:* Barburamu, Nallatumma, Nellatuma, Tumma, Yugalakshamu—; *Tuareg:* Tamat—; *Tuculor:* Gaodi, Gaude, Gaudi—; *Urdu:* Babul—; *Uriya:* Babulo, Boburo, Boburi—; *Wassulu:* Boina—; *Wolof:* Bebneb—; *Zaria:* Gabaruwa—.

3. **Acacia leucophloea** Willd. Sp. Pl. IV (1805) 1083; Bedd. Fl. Sylv. t. 48; Brandis For. Fl. t. 27.—PLATE 376.

A tree with yellowish bark; branches dense, spreading, the young ones pubescent. Leaflets 2-pinnate, subsessile, 2.5-5 cm. long;

4. **Acacia catechu** Willd. Sp. Pl. IV (1805) 1079.—Plate 377.

A moderate sized tree 9-12 m. high; bark dark coloured, rough; young shoots dark brown or purple, glabrous. Leaves 2-pinnate, 10-15 cm. long; main rhachis pubescent, with glands between many of the pairs of pinnae and a large conspicuous gland at or near the middle of the petiole; stipular spines short, hooked, from a broad triangular base, polished; pinnae 10-30 pairs, 3.8-5 cm. long, nearly sessile, their rhachises pubescent. Leaflets 30-50 pairs, 4.5-6 by 1.25 mm., linear, subacute, sessile, often ciliate. Flowers sessile, pale yellow, in peduncled 1-4-nate axillary spikes 5-10 cm. long. Calyx campanulate, 1.25-1.5 mm. long, hairy outside; teeth deltoid, ciliate. Corolla 2-3 times as long as the calyx; lobes ovate-oblong, subacute, pubescent. Pods stalked, 5-7.5 by 1-1.6 cm., flat, thin, brown, shining, with a triangular beak at the apex and narrowed at the base into a stalk 3-6 mm. long. Seeds 3-10.

Distribution: Punjab, N.-W. Himalaya, Central India, Bihar, Ganjam, Burma, throughout the Konkan, S. M. Country, Deccan.

The bark is bitter and acrid; cooling, astringent to the bowels, anthelmintic, antidysenteric, antipyretic; cures itching, sore throat, bronchitis, indigestion, heaviness, ulcers, boils, psoriasis, inflammations, leprosy, anæmia, leucoderma; given in elephantiasis, urinary discharges; strengthens the teeth.—Catechu is acrid and bitter; hot, astringent to the bowels, anthelmintic, tonic, aphrodisiac; cures "kapha" and "vata", ulcers, diseases of the throat, urinary and vaginal discharges, leucorrhœa, leucoderma, piles, erysepelas; cures troubles of the mouth; gives taste; increases appetite; strengthens the teeth (Ayurveda).

In the Konkan, the juice of the fresh bark is given with assafœtida in hæmoptysis, and the flowering tops with cumin, milk and sugar, in gonorrhœa.

Mixed with aromatics it is used in melancholia; powdered and mixed with water it is used in conjunctivitis.

Khersal or catechuic acid is found in cavities of the wood. It

is valued in native practice as a remedy in chest affections. It is thought to promote expectoration.

Kathbol is a mixture of catechu and myrrh, given to women after confinement as a tonic, and to promote the secretion of milk.

The extract known as Catechu or Cutch is used medicinally as an astringent in fevers and other maladies. It is peculiarly useful in diarrhœa, with pyrosis, depending upon a relaxed state of the intestinal mucous membrane. Locally, it has also been used with much advantage in sponginess of the gums, relaxation of the uvula, hypertrophy of the tonsil, and as an astringent injection in the treatment of leucorrhœa and a tonic in menorrhagia.

The bark in combination with other drugs is prescribed for snake-bite (Charaka).

The bark is not an antidote to snake-venom (Mhaskar and Caius).

Assam: Kat, Khoira, Koir—; *Baroda:* Kher—; *Bengal:* Khayer, Kuth—; *Bombay:* Khaderi, Khaira, Khera—; *Burma:* Sha—; *Canarese:* Kachu, Kaggali, Kanti, Kashu, Kempukhaira-pajali, Kugli, Seredu, Shemi, Tere—; *Central Provinces:* Khair—; *Ceylon:* Kodalimurungai—; *Deccan:* Katha, Khair, Khairbabul—; *Dutch:* Ketechuboom, Katsjouboom—; *English:* Black Catechu, Catechu, Catechu Nigrum, Cutch, Pegu Catechu—; *French:* Acacia du cachou, Cachou, Cachoutier—; *German:* Katechubaum, Kaschubaum—; *Greek:* Acanthe—; *Gujerati:* Kher, Kherio, Kheriobaval—; *Hindi:* Katha, Khair, Khairbabul—; *Italian:* Cacciu, Calto, Catechu, Catto d' India—; *Koya:* Pasaragynna—; *Kumaon:* Khair—; *Lambadi:* Kalariro—; *Malayalam:* Kadaram, Karinnali, Senkarinnali—; *Marathi:* Kaderi, Khaderi, Khair, Khaira, Khera, Lalkhair—; *Mundari:* Janumkhair—; *Mysore:* Tare—; *Nepal:* Khair—; *Portuguese:* Cutch—; *Sanskrit:* Bahushalya, Balapatra, Balaputra, Balatanaya, Dantadhavana, Gayatri, Homa, Hihmashalya, Jihvashalya, Jivamangalya, Kantaki, Kantakidruma, Karkati, Khadira, Khadyapatri, Kshitikshana, Kushtarhita, Kushthari, Medhya, Mridupatrika, Pathidruma, Prasakha, Raktasara, Saradruma, Sushalya, Tiktasara, Vakrakantaka, Yajnanga, Yajnika, Yupadru—; *Santal:* Khaiyar—;

Sinhalese: Ratkihiri—; *Spanish:* Catechu—; *Surat:* Kher—; *Tamil:* Kadiram, Karangalli, Karungali, Kasukkatti, Kodam, Kudakkini, Odalai, Sengarungali, Sirumarodam—; *Telugu:* Kasu, Khadiramu, Mallasandra, Podalamanu, Sandra, Sundra, Tellatumma—; *Tulu:* Kashu—; *Uriya:* Bimbu, Khodiro, Khoiro—.

5. **Acacia ferruginea** DC. Prodr. II (1825) 458.—PLATE 378.

A moderate sized tree; bark rough, rusty brown; young parts glabrous; prickles sometimes suppressed. Leaves 2-pinnate, 5-11.3 cm. long; main rhachis slender, glabrous, with a large gland on the petiole and another between the uppermost pair of pinnae; petioles 2.5-5 cm. long, thickened at the base; stipular spines short, hooked, in pairs; pinnae 3-6 pairs, 5-7.5 cm. long, distant, shortly stalked, the stalks thickened at the base, and the rhachis slender, glabrous. Leaflets 10-20 pairs, 6-8 by 2.5-3 mm., linear-oblong, obtuse, unequal-sided, glaucous above, paler beneath, rigidly subcoriaceous, glabrous, petiolules very short. Flowers pale yellow, sessile, in slender axillary spikes 7.5-10 cm. long; peduncles often numerous, glabrous. Calyx campanulate, 1.5 mm. long, glabrous; teeth distinct, deltoid. Corolla 3-4 mm. long, divided about half way down; lobes oblong-lanceolate, acute. Pods stalked, 7.5-12.5 by 2-2.5 cm., straight, flat, thin, brown, reticulately veined, glabrous, indehiscent, the upper suture narrowly winged. Seeds 4-8.

Distribution: Gujarat, Konkan, Deccan, Circars, Carnatic, in dry forests, to the E. slopes of the W. Ghats.

The bark is bitter and acrid; hot, anthelmintic, cure itching, leucoderma, "kapha" and "vata", ulcers, stomatitis, diseases of the blood (Ayurveda).

The extract of the leaves is astringent, styptic, tonic; stops suppuration; enriches the blood; useful in liver complaints, diseases of the eye, diarrhœa, dysentery, gonorrhœa, gleet, burns and scalds; beneficial to the alimentary and urinary tracts (Yunani).

The bark is used as an astringent.

The gum is demulcent, emolient, nutrient.

The pods and the extract from them are astringent and demulcent.

A decoction of the bark of this plant, together with that of *Tamarindus Indica* and a few other trees, is frequently resorted to by the natives of this country, as a gargle in sore-mouth, and its use has often been attended with success to my own knowledge (Moodeen Sheriff).

Berar: Sonkhair—; *Bhil:* Teorikhair—; *Bombay:* Kaiger, Ker—; *Canarese:* Banni—; *Gond:* Kar, Khair—; *Gujerati:* Kanti, Khaiger—; *Konkani:* Ker—; *Malayalam:* Vanni—; *Mandvi:* Khogra—; *Marathi:* Pandhrakhair—; *Nepal:* Khour—; *Panch Mahals:* Kaiger—; *Portuguese:* Pau ferro—; *Sanskrit:* Brahmashalya, Dvijapriya, Kadara, Kantadhya, Karmmuka, Khadira, Khadiroparna, Kujakantaka, Mahavriksha, Memivriksha, Pathidruma, Shvetasara, Shyamasara, Somasara, Somavalkala, Somavriksha—; *Tamil:* Peykkarungali, Simaivellel, Vanni, Velvel—; *Telugu:* Vannesandra, Vellisandra, Tellatumma—.

6. **Acacia senegal** Willd. Sp. Pl. IV (1805) 1077.—PLATE 379.

A small tree 3-6 m. high; stem prickly; branches flexuose, glaucous-grey; young shoots pubescent. Leaves 2-pinnate, 2-3.2 cm. long; main rhachis pubescent, with a gland on the petiole below the lowest pair and one between the uppermost pair of pinnae; stipular spines usually 3, the 2 lateral nearly straight or slightly curved upwards, the middle one curved downwards, all dark brown, polished; pinnae 3-5 pairs, 1.3-2 cm. long, very shortly stalked, their rhachises pubescent. Leaflets 8-15 pairs, 2-3 by 1.25 mm., linear, subobtuse, glabrous, pale glaucous-green; petiolules very short. Flowers fragrant, in spikes 5-10 cm. long; peduncles axillary, 1-3-nate. Calyx campanulate, 2 mm. long, divided about $1/3$ of the way down; teeth distinct, deltoid. Corolla white, twice as long as the calyx, divided about $1/2$ way down; lobes lanceolate, acute. Filaments white. Anthers yellow. Pods shortly stalked, 7.5 by 2 cm., linear-oblong, thin, flat, flexible, attenuated at both ends, reticulately veined, pale brown and glabrous when ripe. Seeds 5-6.

Distribution: Punjab, Rajputana, Sind, Baluchistan.—Arabia, tropical Africa.

The gum is used as a demulcent and emollient. It is used externally to cover inflamed surfaces, such as burns, sore nipples, etc., and it blunts the acridity of irritating matters by being blended with them. The powdered gum has also been found useful in checking hæmorrhage from leech bites, and when blown up the nostrils it checks severe epistaxis.

Internally, it has been found useful in inflammations of the gastric and intestinal mucous membrane. If held in the mouth in the form of a special preparation, the gum is found serviceable in allaying cough, thus affording relief. Its influence as a demulcent is supposed to extend even to the urinary organs. The gum has also been recommended as a substitute for amylaceous food in diabetes, since it is not converted into sugar, but it does not appear to have been attended with any appreciable benefit (Watt).

The gum is used as a medicine in Las Bela (Hughes-Buller).

Arabic: Auaruar, Hashab—; *Baguirmi:* Guerasa—; *Bambara:* Sadie donkoro—; *Beni-Amer:* Sceloka—; *Bornu:* Kolkol—; *Cutchi:* Achhokher, Kherio—; *French:* Gommier blanc—; *Fulbe:* Patuki danehe—; *Gujerati:* Gorad, Goradiobaval—; *Gurma:* Tulundu—; *Habe:* Bankoro—; *Hausa:* Akoara, Dakwora—; *Kassonke:* Sahefin—; *Kordofan:* Hachab—; *Kotoko:* Maze—; *Las Bela:* Khor—; *Malinke:* Sage—; *Mauritania:* Ronaruan—; *Peuhl:* Patuki—; *Rajputana:* Kumta—; *Sahara:* Askab—; *Sanskrit:* Svetakhadira—; *Sarakolet:* Guese bine—; *Sind:* Khor—; *Sonrai:* Delignie, Kassagnia, Kassarie—; *Sudan:* Hashab—; *Tigrinia:* Kantab—; *Tuareg:* Takora—; *Wolof:* Verek—.

7. **Acacia modesta** Wall. Pl. As. Rar. II (1831) 27, t. 130. —PLATE 380.

A small or medium sized deciduous tree, young shoots glabrous or nearly so. Prickles pseudo-stipular, in pairs below the petioles, compressed, strongly recurved, dark brown, shining, about 5 mm. long. Rhachis 1.3-5 cm. long, with a small gland at the base of the petiole and sometimes one between the uppermost pair of pinnae.

Pinnae 2-3 pairs, 1.3-2.5 cm. long. Leaflets 3-5 pairs, 3.8-10 mm. long, broadly ovate or obovate, oblique, obtuse, glaucous, petiolules minute. Flowers pale, creamy white, in cylindric axillary solitary or geminate pedunculate spikes 3.8-7.5 cm. long; peduncles about 7.5 mm. long. Calyx 7.5 mm. long, broadly campanulate, glabrous. Corolla about twice as long as the calyx. Pod 5-7.5 by 0.7-1.5 cm., thin, flat, straight, apex deltoid with a small straight beak, base attenuated into a distinct stipe, late in dehiscing. Seeds 3-5.

Distribution: Sub-Himalayan tract and Outer Himalaya of the Punjab from the Jumna eastwards ascending to 4,000 feet, Salt Range, Waziristan, Baluchistan.

The tree yields a gum which is regarded by the people of the Peshawar Valley as restorative (Bellew).

Afghanistan: Palosa—; *Baluchistan:* Palos, Palosa, Phulab—; *Ceylon:* Phule—; *Gujarat:* Kantosariyo—; *Punjab:* Phulahi, Phulai—.

8. **Acacia rugata** (Lam.) Ham. in Wall. Cat. 5251.—*Mimosa rugata* Lam. Encycl. I (1783) 20.—*Acacia concinna* DC. Prodr. II (1825) 464.—Plate 381A (under *A. concinna*).

An extensive climbing shrub armed with numerous small hooked prickles; branches brown, dotted with white. Leaves 2-pinnate, 5-10 cm. long; main rhachis armed with sharp hooked prickles, with a large gland at or below the middle of the petiole, and one between the uppermost or the 2 uppermost pairs of pinnae; stipules ovate, cordate; pinnae 4-8 pairs, 2.5-6.3 cm. long, their rhachises slender, grooved, ending in a weak spine. Leaflets subsessile, sensitive, 12-25 pairs, 6-13 by 1.25-2.5 mm., linear, acute or mucronate, unequal-sided, glabrous, base rounded or truncate. Flowers in globose heads, on peduncles 2.5-3.8 cm. long which are fascicled at the nodes or forming racemose panicles at the ends of the branches; bracts oblique, membranous, conspicuous. Calyx funnel-shaped, 2.5 mm. long, divided nearly ½ way down; teeth lanceolate. Corolla 3-4 mm. long; lobes lanceolate. Pods shortly stalked, 7.5-12.5 by 2-2.8 cm., linear-oblong, thick and fleshy when immature, becoming wrinkled when dry, somewhat depressed between the seeds,

and with broad sutures which are sometimes more or less deeply indented. Seeds 6-10.

Distribution: Throughout India.—Malay Islands, China.

The pod is bitter and pungent; cooling, digestible, deobstruent, detergent, purgative, anthelmintic, antidiarrhœal; improves the appetite, but causes "vata"; cures "kapha", biliousness, burning sensation, diseases of the blood, erysepelas, leucoderma, stomatitis, ascites, piles; cardiotonic.—The leaves are cathartic and cure biliousness (Ayurveda).

In China and Japan, the pods are considered emetic, diuretic, and laxative; they are used in constipation, and in troubles of the kidneys and the bladder. Externally they are applied to leprous patches, prurigo, abscesses, eczema, bubos. The seeds are said to facilitate delivery in childbirth.

The fruit is much recommended for the treatment of snake-bite (Sushruta, Yogaratnakara, Brihannighantaratnakara).

Whether used as a collyrium or administered internally the juice of the fruit is useless in the treatment of snake-bite (Mhaskar and Caius).

Bengal: Banritha—; *Bombay:* Shika, Sika—; *Burma:* Kenbwon, Kinbun, Suboke, Suboknwe—; *Canarese:* Mandasige, Ollesige, Shige, Sige, Sigeballi, Sigekai—; *Deccan:* Sikekai—; *Gujerati:* Chikakai—; *Hindi:* Kochi, Ritha—; *Indo China:* Phi tao giap, Som poy—; *Lambadi:* Sikiaro—; *Lepcha:* Toldung—; *Malayalam:* Inna, Shinikkaya—; *Marathi:* Shikakai, Sikekai—; *Oudh:* Aila, Rassaul—; *Sanskrit:* Amala, Bhuriphena, Charmakasha, Dipta, Patraghana, Phena, Saptala, Sara, Sarmakasa, Satala, Svarnapushpi, Vidula, Vimala, Vishanika—; *Saora:* Manjisikaya—; *Tagalog:* Sibog—; *Tamil:* Siyakkay, Nallachiyakkay—; *Telugu:* Chikayi, Manjisikaya, Sikaya—; *Tulu:* Sige—.

9. **Acacia caesia** Willd. Sp. Pl. IV (1805) 1090.—*A. Intsia* Wight & Arn. Prodr. 278 (quoad descript. et spec.).—*Mimosa caesia* Linn. Sp. Pl. (1753) 518 (quoad plantam zeylanicam).—PLATE 381B (under *A. Intsia*).

A large climbing shrub with stout 5-angled stems with minute prickles. Twigs sometimes circinate. Shoots pubescent or tomentose with sharp recurved prickles. Leaf-rhachis 10-20 cm. long pubescent sometimes glabrescent, aculeate, with a large linear-oblong swollen gland at the base often with free conical apex, and a large gland just below 3-4 of the uppermost pinnae. Pinnae 6-8 pairs, 3.8-9 cm. long, rhachis at first closely pubescent or pilose, afterwards thinly so, 1.3-2.5 cm. apart with a distinct short petiolule and 2 setaceous stipellae above the petiolule. Leaflets 8-15 pairs, usually shining, obliquely oblong, sessile, mucronate, smaller 7.5 mm., larger (on the same plant) 1.8 cm. long by 7 mm. wide, with a few fine hairs beneath when young but glabrescent. Panicles axillary and terminal, very narrow and lax up to 45 cm. long with the future leaves very minute and bract-like heads 5-7-nate, red in bud, 13-15 mm. diam. Flowers white with tip of calyx and corolla often red. Bracts between flowers oblong-spathulate acute, ciliate. Calyx 2 mm. (or 2.5 mm. in fresh specimens), length to tip of corolla 2.5-3 mm. Stamens 6.25-6.75 mm. Pod thin with thickened sutures, dark brown, 11.5-15 cm. long by 2-2.5 cm. broad, base rounded or cuneate, stipes 5-6.25 mm. Seeds 1 cm., dark polished brown, oval, flat.

Distribution: Gujarat, Konkan, W. Ghats of Bombay to the Anamalais, Cuddapah.

The flowers are used by Santal women in deranged courses (Campbell).

Canarese: Antarike, Sandemullu—; *Hasada:* Kundurijanumnari—; *Hindi:* Aila—; *Khond:* Sikeri—; *Kolami:* Kundaru—; *Kumaon:* Katrar—; *Lepcha:* Ngraem rik, Payir rik—; *Malayalam:* Attushini, Attu, Inna, Inja—; *Marathi:* Chilari—; *Naguri:* Kundurujanumnari—; *Nepal:* Harrari—; *Santal:* Kondrojanum—; *Sutlej:* Arhaikabel—; *Tamil:* Kariyindu, Indu, Ingkai, Mandarchingai, Singai, Vellindangodi, Vellindu—; *Telugu:* Kondakorinda, Koralakorinda, Korinda, Korindamu, Manjikorinda, Tellakorinda—; *Uriya:* Dontari—.

10. **Acacia pennata** Willd. Sp. Pl. IV. (1805) 1090. —Plate 382.

A scandent shrub, armed with numerous stout slightly hooked or straight prickles (rarely unarmed); young branches pubescent. Leaves 2-pinnate, reaching 15 cm. long; main rhachis densely pubescent, grooved, often prickly, with a large gland above the middle of the petiole and one between each of the 2-4 upper pairs of pinnae; pinnae 8-18 pairs, 3.8-6.3 cm. long, subsessile, usually curved, their rhachises densely pubescent. Leaflets 40-50 pairs, slightly overlapping, 5-8 by 1.25 mm., sessile, linear, obtuse, unequal-sided, glabrous, base oblique, rounded or truncate. Flowers white or pale yellow, in large terminal panicles; heads globose, 1-1.3 cm. diam.; peduncles pubescent, 2-4-nate; bracts linear. Calyx glabrous, 2.5 mm. long, divided $^1/_3$ of the way down; lobes linear-lanceolate, acute. Pods stalked, 10-20 by 2-3.2 cm., straight, flat, thin, dry, strap-shaped, rounded or shortly apiculate, brown, glabrous. Seeds 8-14, ovoid-oblong, compressed, dark brown.

Distribution: Central and E. Himalaya, Bihar, E. and W. Peninsula, Burma, Ceylon. —Malay Islands, tropical Africa, Natal.

The bark is acrid, bitter, sour, hot; cures diseases of the blood, biliousness, "tridosha", bronchitis, asthma (Ayurveda).

In the Konkan, the leaf-juice mixed with milk is given to infants who suffer from indigestion of milk with black stools.

In bleedings from the gums the leaves are chewed with cumin and sugar; they are also rubbed to a pulp and mixed with cow's milk, cumin and sugar, as a remedy for scalding of urine.

In the Gold Coast, the bark of the white variety is used with pepper as an enema for stomach complaints.

Bapat recommends the juice of the bark in combination with other drugs as a cure for the bites of Russell's Viper.

The juice of the bark is useless in the antidotal and sympathetic treatment of both viperine and colubrine bites (Mhaskar and Caius).

Anum: Nklebe—; *Bengal:* Kuchui—; *Burma:* Suyit—; *Canarese:* Kadusige, Mullusige, Sige—; *Dehra Dun:* Agiabel, Agla, Alay—; *Ewe:* Damalia—; *Garhwal:* Agalai, Agla—; *Gujerati:* Kherval—; *Hasada:* Kundurijanamnari—; *Hindi:* Aila, Biswul—; *Indo China:* Cham bia, Thma rop, Thmar top—;

Kakamega: Mughobari—; *Kamba:* Mukuswi—; *Kharwar:* Arar—; *Kolami:* Kundaru—; *Kumaon:* Agla, Awal—; *Kwahu:* Nguare—; *Lambadi:* Silatero—; *Lepcha:* Baerzhu, Tolrik—; *Malaya:* Gurwa—; *Malayalam:* Kattusinikka, Sunna—; *Marathi:* Shemberti, Shembi, Thembi—; *Masai:* Olgirigiri—; *Naguri:* Kundurujanumnari—; *Nepal:* Arare, Arfu—; *Porebunder:* Jhindhatodi, Khewel, Kheweliobaval—; *Ramnagar:* Agalai, Agla—; *Sanskrit:* Ari, Ballikhadira, Khadirapatrika, Sandanika, Silikhadira, Svadikhallari, Uddala—; *Santal:* Undaru—; *Sinhalese:* Hinguru, Godahingulu—; *Tamil:* Indambudai, Indamullu, Indu, Kattindu, Mulluchingai, Peychiyakkai, Singai, Singaimullu—; *Telugu:* Giddukorinda, Karusikaya, Mulukorinda—; *Twi:* Nguare, Nwerair—; *Uriya:* Potadontari—.

11. **Acacia suma** Ham. in Wall. Cat. (1828) 5227C.—*Mimosa Suma* Roxb. Hort. Beng. 41.—*Acacia catechu* W. & A. Prodr. 272 (excl. syn.); Bedd. Fl. Sylv. t. 49.

A middle sized tree; bark white; young shoots downy. Leaves 2-pinnate, 10-15 cm. long; main rhachis pubescent, with glands between many of the pairs of pinnae and a large conspicuous gland at or near the middle of the petiole; petioles 2.5-3.2 cm. long; stipular spines short, straight or slightly hooked, from a broad triangular base, polished; pinnae 10-30 pairs, 3.8-5.3 cm. long, shortly stalked. Leaflets 30-50 pairs, 5-6 mm. by 1.25 mm., closely set on the rhachis, linear, subacute, sessile, pale green, rigidly coriaceous, glabrous or nearly so. Flowers sessile, whitish, in peduncled 1-4-nate spikes 7.5-10 cm. long, the rhachis densely pubescent. Calyx campanulate, downy, 2 mm. long; teeth short, deltoid, ciliate. Corolla 2.5-3 mm. long, divided about half way down; lobes narrow-oblong, subacute. Pods 7.5-12.5 by 1.3-2 cm., flat, with a triangular beak at the apex, tapering at the base into a stalk 1.3-2 cm. long, reticulately veined, glabrous.

Distribution: Bengal, Bihar, W. Peninsula.

The bark is used as an astringent.

The tree yields a gum which is officinal in several countries.

Banswara: Dhaulakhejra—; *Bengal:* Saikanta—; *Canarese:*

Bannimara, Bilejali, Chelayudi, Mugula, Mugli, Shami—; *Dangas:* Sonkairi—; *Malayalam:* Venkarinnali—; *Mandwi:* Gorado—; *Mysore:* Mugalisoppu—; *Pertabgarh:* Kumtia—; *Sanskrit:* Shami—; *Tamil:* Kovil, Selai, Selaivunjai, Silai, Silaiyunjai—; *Telugu:* Tellachandra—; *Uriya:* Guanria, Somi, Somiguanria—.

Albizzia Durazz.

Trees. Leaves 2-pinnate. Flowers in globose heads, sessile or pedicellate, hermaphrodite, usually 5-merous. Calyx campanulate or funnel-shaped, distinctly toothed. Corolla funnel-shaped, the petals connate below the middle. Stamens indefinite, monadelphous at the base; filaments much longer than the corolla; anthers minute, not gland-crested. Ovary sessile or shortly stalked; style filiform; stigma minute, capitate. Pod large, thin, flat, strap-shaped, straight, indehiscent or subindehiscent, continuous within, the sutures not thickened.—Species 50.—Warm regions of the Old World.

A. Pinnae 2-4 pairs, rarely 6 pairs. Leaflets exceeding 6 mm. broad
  I. Flowers pedicelled. Calyx 4 mm. long .... 1. *A. lebbeck.*
  II. Flowers sessile. Calyx less than 3 mm. long
    a. Calyx 1.25 mm. long, pubescent, teeth obsolete .... 2. *A. odoratissima.*
    b. Calyx 2.5 mm. long, glabrous, teeth distinct ...... 5. *A. procera.*
B. Pinnae 4-12 pairs. Leaflets 20-50 .... 3. *A. julibrissin.*
C. Pinnae 6-20 pairs. Leaflets less than 6 mm. broad
  I. Stipules very large .... 6. *A. stipulata.*
  II. Stipules minute .... 4. *A. amara.*

The following species are used medicinally in China—*A. julibrissin* Dur.—; in Indo China—*A. lebbeck* Benth.—; in Annam —*A. julibrissin* Dur.—; in Abyssinia—*A. anthelmintica* Brong.—; in Madagascar—*A. fastigiata* Oliv., *A. lebbeck* Benth.—; in East Africa—*A. gummifera* (Gmel.) C. A. Sm.—; in Northern Rhodesia —*A. antunesiana* Harms.—; in Southern Africa—*A. gummifera* (Gmel.) C. A. Sm., *A. lophantha* Benth.—; in South-West Africa—*A. anthelmintica* Brong.—.

1. **Albizzia lebbeck** Benth. in Hook. Lond. Journ. Bot. III (1844) 87.—Plate 383.

An unarmed deciduous tree 12-21 m. high; bark pale; young shoots glabrous. Leaves abruptly 2-pinnate; main rhachis pubescent

or glabrous, furnished with a large gland on the petiole above the base and one below the uppermost pair of pinnae; petioles swollen and hairy at the base; pinnae 2-3 (rarely 4) pairs, 10-12.5 cm. long, their rhachises glabrous or pubescent, swollen and hairy at the base. Leaflets 5-9 pairs, 2.5-4.5 by 1.6-2 cm., with glands between their bases, the lateral leaflets elliptic-oblong, the 2 terminal obovate-oblong, all pale green, unequal-sided, very obtuse, glabrous above, pubescent and reticulately veined beneath, base obliquely rounded or truncate; petiolules very short, hairy. Flowers white, fragrant, in globose umbellate heads 2-3.8 cm. diam. (not including the stamens); peduncles 3.8-7.5 cm. long, more or less pubescent, solitary or 2-4 together from the axils of the upper leaves; pedicels 2.5-3 mm. long, pubescent. Calyx 4 mm. long, pubescent; teeth short, deltoid. Corolla 1 cm. long; tube glabrous; lobes 2.5 mm. long, triangular, acute, pubescent outside. Stamens much longer than the corolla; filaments connate at the base into a short tube. Pods 10-30 by 2-4.5 cm., linear-oblong, bluntly pointed, thin, pale yellow, reticulately veined above the seeds, smooth, shining. Seeds 4-12, ellipsoid-oblong, compressed, foveolate on the faces, pale brown.

Distribution: Throughout India, usually planted, tropical and subtropical Asia and Africa.

The root is used in hemicrania.—The bark is bitter; cooling, alexiteric, anthelmintic; cures "vata", diseases of the blood, leucoderma, itching, skin diseases, piles, excessive perspiration, inflammation, erysepelas, bronchitis; good in rat-bite.—The leaves are good for ophthalmia.—The flowers are given for asthma, and for snake-bite.—All parts of the plant are recommended for the treatment of snake-bite (Ayurveda).

The root is astringent and prescribed for ophthalmia.—The bark is anthelmintic; relieves toothache, strengthens the gums and the teeth; used in leprosy, deafness, boils, scabies, syphilis, paralysis, weakness.—The leaves are good in night blindness.—The flowers are aphrodisiac, emollient, maturant; their smell is useful in hemicrania.—The seeds are aphrodisiac, tonic to the brain; used for gonorrhœa, and tuberculous glands; the oil is applied topically in leucoderma (Yunani).

The bark and seeds are astringent, given in piles, diarrhœa, etc. The flowers are used as a cooling medicine, and also externally applied in boils, eruptions and swellings. The leaves are useful in ophthalmia.

The seeds form part of an *anjan* used for ophthalmic diseases. The oil extracted from them is considered useful in leprosy. The bark is applied to injuries to the eye.

The powder of the root-bark is used to strengthen the gums when they are spongy and ulcerative.

In Indo China, the bark and the seeds are considered astringent; they are prescribed for diarrhœa, dysentery, and piles. The flowers are used as an emollient and applied to boils, and carbuncles.

In Madagascar, the leaves are given as a cure for syphilis.

The plant is considered a most potent alexipharmic and every part of it is prescribed for the treatment of bites and stings from venomous animals.

No part of the plant has any antidotal value against either snake-(Mhaskar and Caius) or scorpion-(Caius and Mhaskar) venoms.

Andamans: Beymada, Gachoda—; *Arabic:* Sultanaulasjar—; *Bengal:* Siris, Sirisha—; *Bombay:* Garso, Harreri, Siris—; *Burma:* Kokko—; *Cambodia:* Chang riek—; *Canarese:* Bage, Doddabage, Doddasirisa, Hombage, Sirisa, Sirsul—; *Ceylon:* Kona, Vahai—; *English:* Parrot Tree, Siris Tree, Sizzling Tree—; *French:* Acacia lebbek, Bois noir, Ebénier d' Orient—; *Gujerati:* Kalosadasado, Kaliosaras, Kaloshirish, Kalokansakio, Pilosarshio—; *Hindi:* Garso, Kalshish, Kalsis, Lasrin, Mathirshi, Shiris, Shirish, Sirai, Sirar, Siras, Sirin, Siris, Sirsa, Tantia—; *Hova:* Benvara, Bonara—; *Indo China:* Chres—; *Konkani:* Garso—; *Kotra:* Shrin—; *Kumaon:* Bhandir, Siris—; *Lambadi:* Ghulmero, Motisarsiro—; *La Reunion:* Bois noir—; *Lepcha:* Harrasiris—; *Malayalam:* Kattuvaka, Nenmani, Vaka—; *Marathi:* Chichola, Kalashiras, Mothasiras, Shirish—; *Nepal:* Harrasiris—; *Panch Mahals:* Doli, Saras—; *Persian:* Darakhtejakheria—; *Sanskrit:* Barhapushpa, Bhandi, Bhandika, Bhandila, Bhandira, Kalinga, Kapitaka, Kapitana, Karnapura, Krishnashirisha, Lomashapushpaka, Madhupushpa, Murdhapushpa, Mridupushpa, Plavaga, Shankiniphala, Shikiniphala, Shirisha,

Shitapushpa, Shukadruma, Shukapriya, Shukapushpa, Shukataru, Shukeshta, Shuksatam, Shyamavarna, Shymala, Supushpaka, Svarnapushpaka, Uddanaka, Vishaghati, Vishahanta, Vishanashana, Vrittapushpa—; *Santal:* Chapotsiris—; *Sind:* Mahari, Shirrus, Sirasa, Suri—; *Sinhalese:* Mara—; *Tagalog:* Aninapla, Languil—; *Tamil:* Adukkavagai, Kalindi, Kattuvagai, Pandil, Perunvagai, Piram, Siridam, Sonagam, Sugattram, Undugam, Vagai—; *Telugu:* Dirisanamu, Girisamu, Kapitanamu, Peddadirisanamu, Sirishamu—; *Tulu:* Bage—; *Urdu:* Darash—; *Uriya:* Bodosirisi, Sirisi, Siriso, Tinya—; *West Indies:* Woman's Tongue—.

2. **Albizzia odoratissima** Benth. in Hook. Lond. Journ. Bot. III (1844) 99.—Plate 384.

A tall unarmed tree, often reaching 24 m. high; young shoots dark coloured, pubescent. Leaves abruptly 2-pinnate; main rhachis downy, 15-30 cm. long, with a large sessile gland on the petiole a little above its base and also at the bases of 1-2 of the upper pinnae; pinnae usually 4 pairs, rather distant, 7.5-15 cm. long, their rhachises pubescent. Leaflets 8-15 pairs, sessile, 2-2.8 by 1-1.3 cm., obliquely oblong, rounded at the apex, reticulately veined, the midrib about $^1/_3$ the breadth of the blade from the upper edge, dark green and slightly pubescent above, glaucous and pubescent beneath, base very obliquely rounded. Flowers fragrant, sessile, in numerous small 10-12-flowered heads 2-2.5 cm. across; peduncles 6 mm. long, solitary or 2-4 together, arranged in terminal panicles. Calyx 1.25 mm. long, pubescent; teeth obsolete. Corolla white, 4 mm. long, grey-silky outside; teeth ovate-lanceolate, acute. Stamens twice as long as the corolla; filaments pale yellow, connate at the base into a tube half as long as the corolla-tube. Pods shortly stalked, 10-20 by 2.5-3.8 cm., thin, flexible, glabrous, slightly reticulately veined, brown. Seeds 8-12, broadly ovate, 8 by 6 mm., much flattened, yellow.

Distribution: Throughout India, Ceylon.

The bark applied externally, is considered efficacious in leprosy and in inveterate ulcers. The leaves boiled in *ghi* are used by Santals as a remedy for coughs.

Assam: Jatikoroi, Siris—; *Bhil:* Chickla—; *Bombay:* Chichada, Chichna, Shiras, Siras, Siris—; *Burma:* Thitmagyi, Thitpyu—; *Cachar:* Koroi—; *Canarese:* Basari, Bettasujjalu, Bilivara, Bilkumbi, Bilwara, Enubage, Godhunchi, Golanchu, Kadubage, Kalsirisa, Pullibage—; *Ceylon:* Ponnaimurankai—; *Chanda:* Chichwa—; *Deccan:* Chichada, Chichna, Shiras, Siras, Siris—; *Garo:* Sisoo—; *Gond:* Chichola, Chichwa, Yerjoohetta—; *Gujerati:* Kalosarasio, Siras—; *Hindi:* Bansa, Bas, Bassein, Bersa, Bhandir, Kaliasiris, Sira, Shirish, Siris—; *Jubbulpore:* Bansa—; *Kadir:* Sittilaivagai—; *Khond:* Sirsitentura—; *Konkani:* Godunchi, Siros—; *Koya:* Shintayelagu—; *Kurku:* Chichora—; *Lambadi:* Kalasiris—; *Lepcha:* Sedung, Tedong—; *Malayalam:* Karintakara, Karuvaka, Nellivaka, Pulivaka, Selanni, Vaka—; *Marathi:* Chichunda, Pandurashirish, Ranshirash, Shiras, Siris—; *Mundari:* Dhorkhair, Keadcadlomdaru—; *Nepal:* Karkursiris—; *Panch Mahals:* Harreri, Kalisaras—; *Porebunder:* Gholiosaras, Gholokansakio, Gholosadasado, Gholoshirash—; *Portuguese:* Favas de Lazaro—; *Punjab:* Karmaru, Karmbru, Lasrin, Polach—; *Sadani:* Dhorkhairdaru—; *Sanskrit:* Shirisha, Sirisha, Svetashirisha—; *Santal:* Jangsiris—; *Sinhalese:* Huremara, Huriyi, Suriyamara—; *Tagalog:* Malatoco—; *Tamil:* Kalitturinjil, Kaliyunjai, Karuvagai, Purusilai, Silai, Silaiyunjai, Sittilaivagai—; *Telugu:* Bandisinduga, Chinduga, Sinduga, Telasu—; *Tulu:* Embage, Pullibage—; *Uriya:* Bonosirisi, Sirisi, Sirocho, Tinya—.

3. **Albizzia julibrissin** Durazz. in Mag. Tosc. III, 4 (1772) 11.—Plate 385B.

A medium sized tree, bark dark grey, nearly smooth, young shoots and inflorescence clothed with yellowish brown pubescence. Rhachis 10-25 cm. long, with a large gland on the petiole 1.3-2.5 cm. from the base and sometimes 1 or more between the upper pairs of pinnae; stipules 7.5 mm. long, linear, caducous. Pinnae (4-) 6-8 (-15) pairs, 7.5-15 cm. long. Leaflets 10-30 pairs, 1.3-1.8 by 0.4-0.6 cm., falcate-oblong, acute, oblique, dark green above, pale beneath, more or less adpressed hairy on both sides, midrib close to the upper edge, subsessile. Flowers pink (rarely creamy) in

peduncled heads, solitary or in fascicles of 2-3 arranged in a short terminal raceme, the lowest often axillary; peduncles 3.8-7.5 cm. long; bracts 4-7.5 mm. long, linear, caducous; pedicels 1.25 mm. long. Calyx 4 mm. long, tubular, pubescent, teeth short, triangular. Corolla 7.5 mm. long, pubescent outside; lobes 2.5 mm. long, lanceolate, acute. Stamens 2.5-3.3 cm. long, staminal tube about as long as the corolla-tube. Pod 7.5-12.5 by 1.5-2.5 cm., thin, pubescent till mature, pale brown or yellowish, with thickened sutures. Seeds 8-12.

Distribution: Outer Himalaya from the Indus eastwards to Sikkim, ascending to 6,000—7,000 ft.—E. and Central Asia, China, Japan, Abyssinia.

The therapeutic properties are the same as those of *A. lebbeck.*

Annam: Hiep hoan bi—; *Bashahr:* Shirin, Sirsang—; *Bengal:* Kalkora—; *Canarese:* Elesujjalubage, Sela, Selabage—; *Chinese:* He Huan—; *French:* Arbre à soie, Arbre de soie—; *Garhwal:* Bhandir, Sirsa—; *Hindi:* Barau, Baraulia, Bhokra, Karmaru, Kurmura, Lalsiris—; *Ilocano:* Cariquis, Oonog—; *Jaunsar:* Bhandiskurmura—; *Koya:* Sindugu—; *Kumaon:* Kaunera—; *Nepal:* Lakkey—; *North-Western Provinces:* Baran—; *Punjab:* Brind, Buna, Kurmru, Mathirshi, Shirsh, Sirin, Shishi, Surangru, Tandai—; *Tagalog:* Carisquis—; *Tamil:* Selaivagai—; *Telugu:* Kondaganam, Nallasinduga, Sansu, Sinduga—; *Uriya:* Tentuliya—.

4. **Albizzia amara** Boivin in Encyc. du 19e Siècle II, 2, 34; Benth. in Hook. Lond. Journ. Bot. III (1844) 90.—*Mimosa amara* Roxb. Corom. Pl. t. 122.—Plate 385A.

A small much-branched unarmed tree; young shoots clothed with yellowish grey pubescence. Leaves abruptly 2-pinnate; main rhachis 5-10 cm. long, densely pubescent with a small gland about the middle of the petiole and another between the uppermost pair of pinnae; stipules minute; pinnae 6-15 pairs, 2.5-5 cm. long, their rhachises pubescent. Leaflets 10-30 pairs, sessile, close, 6-8 by 1.25-2 mm., linear-oblong, obtuse or subacute, the midrib nearly in the centre, green and glabrous above, glaucous and more or less pubescent beneath. Flowers subsessile, fragrant, in 12-20-flowered heads; peduncles solitary or in fascicles of 2-4 in the axils of the upper

leaves, not forming a panicle, pubescent. Calyx 1.7-2.5 mm. long, funnel-shaped, pubescent, scarcely pedicelled; teeth short. Corolla yellow, nearly 3 times as long as the calyx, pubescent outside; lobes linear-lanceolate. Stamens 1.3-1.6 cm. long; filaments pinkish. Pods 10-18 by 2-2.8 cm., stalked, thin, flat, abruptly pointed, slightly transversely veined. Seeds 6-8.

Distribution: Throughout the Presidency in dry forests, N. Circars, Deccan and Carnatic to S. Travancore and up to 3,000 ft.

The seeds are astringent; given in piles, diarrhœa, gonorrhœa, etc., the oil extracted from them is said to cure white leprosy. The flowers are considered as a cooling medicine, and are externally applied to boils, eruptions, and swellings. The leaves are regarded as useful in ophthalmia.

Bombay: Lallei—; *Canarese:* Balukambi, Sujjalu, Tuggali, Tugli—; *Coorg:* Kadusige—; *Gujerati:* Moto sarsio—; *Lambadi:* Sigiriya—; *Madura:* Wusel—; *Malayalam:* Sulivaka, Varasi—; *Marathi:* Lali, Lulai—; *Sanskrit:* Krishnasirisha—; *Tamil:* Arappu, Munnam, Sayalvagai, Sikkram, Sikkri, Turinjil, Ushil, Ushilai, Ushilam, Udu, Unjai, Unjil—; *Telugu:* Chikreni, Nallaregu, Nallangi, Sigara, Sirikenu—.

5. **Albizzia procera** Benth. in Hook. London Journ. Bot. III (1844) 89.

An unarmed tree 18-24 m. high; young shoots pale, lenticellate. Leaves abruptly 2-pinnate; main rhachis glabrous, 30-45 cm. long, with a large gland on the petiole a little above its base; pinnae 2-6 pairs, 12.4-15 cm. long, their rhachises glabrous and with an oval gland below the uppermost pair of leaflets. Leaflets 6-12 pairs, 2.5-3.8 by 1.6-2.2 cm., obtuse or subacute, dark green and glabrous above, more or less grey-pubescent beneath, base obliquely cuneate on the upper, rounded on the lower margin; petiolules 1.25 mm. long. Flowers sessile, in numerous small 12-20-flowered heads 2 cm. across; peduncles 1.3 cm. long, in fascicles of 3-5 (rarely solitary), arranged in terminal panicles. Calyx 2.5 mm. long, glabrous; teeth distinct, triangular. Corolla 5 mm. long, pubescent outside; teeth lanceolate, half as long as the corolla-tube. Stamens $1\frac{1}{2}$ times as

long as the corolla; filaments greenish-yellow, connate at the base into a tube as long as the corolla-tube. Pods scarcely stalked, at length dehiscent, 10-20 by 1.3-2.2 cm. thin, flexible, bright orange-brown, smooth and glossy, faintly reticulate above the seeds. Seeds 6-12, broadly ovate, 8 by 6 mm., much flattened, pale brown.

Distribution: Central and E. Himalayas, Bihar, W. Peninsula, Burma.—China, Malay Archipelago, Philippines.

The leaves are insecticide. Made into poultice they are applied to ulcers.

Andamans: Burda—; *Assam:* Kori, Koroi—; *Bengal:* Kori, Koroi—; *Bhil:* Kinni—; *Bileno:* Sobcana, Ssobkana—; *Bombay:* Gurai, Karalla, Karallu, Kilai, Kinai, Kuraitihiri, Tihiri—; *Burma:* Seet, Sit—; *Canarese:* Adhanji, Bage, Belati, Billibage, Chikul, Salabage, Salayudi—; *Deccan:* Kanalu—; *Dehra Dun:* Karha, Karhai, Karhar—; *English:* White Siris—; *Garhwal:* Karao—; *Garo:* Khili, Kili—; *Gond:* Passerginni—; *Hindī:* Baro, Garso, Gurar: Gurbari, Gurkur, Karanji, Karhar, Karo, Karolu, Karra, Safedsiris—; *Igorrote:* Boac—; *Ilocano:* Adaan—; *Kharwar:* Garso—; *Khond:* Guramanja—; *Kolami:* Pandrai—; *Konkani:* Quainai—; *Lambadi:* Bag—; *Lepcha:* Takmur—; *Magahi:* Choi—; *Malayalam:* Chalavaka, Karuntakara, Kutamvaka, Vaka, Vellavaka—; *Marathi:* Kinai, Kinhai, Kinnigurai—; *Mechi:* Laokri—; *Nepal:* Sittosiris—; *Pampangan:* Anitap—; *Philippines:* Ananapla, Paihot—; *Ramnagar:* Karha—; *Tagalog:* Adaan, Adyangao, Ananaplas, Ayangao, Dariangao—; *Tamil:* Kandaivagai, Nallavagai, Salaiyunjil, Vagai, Velvagai—; *Telugu:* Chigara, Dirisanamu, Ganaru, Kondadirisanamu, Peddapachcharu, Tellachinduga, Telladinisanamu, Tellasapara—; *Thana:* Kinhai—; *Tigrinia:* Cigono, Hamasseran, Igjano, Tschigono—; *Uriya:* Sarapatri, Sirisi, Suropotro, Tinia—; *Visayan:* Paihod—.

6. **Albizzia stipulata** Boivin in Encyc. du XIX Siècle II, 33; Benth. in Hook. Lond. Journ. Bot. 3 (1844) 92; Bedd. Fl. Sylv. t. 55.

A tall unarmed evergreen tree; young shoots clothed with fine grey or golden-yellow pubescence. Leaves abruptly 2-pinnate; main

rhachis 15-38 cm. long, at first pubescent, afterwards glabrous, with a large sessile gland on the petiole about 2.5 cm. above its base and with smaller glands between each of the uppermost 2-9 pairs of pinnae; stipules very large, soon deciduous, sometimes exceeding 2.5 cm. long, unequally cordate, acuminate with a filiform tail, membranous, pubescent, orange-brown, the base much dilated on one side; pinnae 7-20 pairs, shortly stalked, their rhachises tawny-pubescent, 5-12.5 cm. long. Leaflets membranous, 30-45 pairs, 6-8 by 1.6-2.5 mm. long, linear-oblong, falcate, pointed, pale green and glabrous above, glaucous and pubescent beneath, the midrib close to the upper margin, base obliquely rounded at the lower side. Flowers in small panicled heads; peduncles 2-3.2 cm. long, pubescent, solitary or in fascicles of 2-4; bracts ovate, acuminate, membranous, 6-13 mm. long, deciduous; pedicels 1.2 mm. long. Calyx 2.5 mm. long, funnel-shaped, pubescent; teeth short, acute. Corolla yellowish white, densely pubescent outside, 5-6 mm. long; lobes half as long as the tube, lanceolate, acute. Stamens 4 times as long as the corolla, connate into a tube longer than the corolla-tube. Pods very shortly stalked, 12.5-18 by 2-2.7 cm., thin, pale brown, glabrous, faintly reticulately veined. Seeds 8-12, ovate, 6 by 5 mm., much compressed, dark brown, smooth. The large stipules are sufficiently characteristic to determine this species when growing. These, however, soon fall off and are often wanting in Herbarium specimens.

Distribution: Throughout India.—S. E. Asia.

An infusion of the bark is used as a lotion for cuts, scabies, and other skin diseases.

Almora: Kalasiri—; *Assam:* Sau, Sow—; *Bengal:* Amluki, Chakua—; *Bombay:* Udala—; *Burma:* Bnumeza, Bumaiza—; *Canarese:* Bagana, Bage, Bettabage, Hotebaghi, Hottubage, Kalbage, Kalbaghi—; *Coorg:* Kottapali—; *Garo:* Selcho—; *Hindi:* Kanujera, Pattia, Samsundra, Siran—; *Khond:* Goira, Goiri—; *Kolami:* Chapun, Keraserum—; *Konkan:* Phalari—; *Koya:* Kondadirasanamu— *Kumaon:* Siris—; *Lepcha:* Singriang—; *Magahi:* Bhummaiza, Pokoh—; *Malayalam:* Mottavaka, Pottuvaka—; *Marathi:* Udala—; *Mechi:* Bunsobri—; *Nepal:* Kalasiris—;

Panch Mahals: Shembar—; *Punjab:* Kasir, Oe, Oi, Shirsha, Sirin—; *Sinhalese:* Hulanmara, Kabal: Kabalmaragass—; *Tamil:* Katturinjil, Pilivagai, Silai, Silaivagai—; *Telugu:* Chindaga, Chinduga, Kondachiguru, Kondachiragu—; *Thana:* Phalari—; *Tulu:* Pottubage—; *Uriya:* Gudanaudia, Reyi—.

PITHECELLOBIUM Mart.

Erect trees or shrubs, unarmed or with spinescent stipules or axillary spines. Leaves 2-pinnate; stipules various. Flowers usually in globose heads or cylindric spikes, 5- (rarely 6-) merous, usually hermaphrodite. Calyx campanulate or funnel-shaped, shortly toothed. Corolla funnel-shaped, the petals valvate, united below for ½ — ⅔ of their length. Stamens monadelphous, much exserted; anthers not gland-crested. Ovary sessile or stalked; ovules many; style filiform; stigma minute, capitate. Pod strap-shaped, circinate or falcate (rarely straight), usually dehiscent throughout the lower suture and much twisted in a late stage, the sutures not or slightly thickened. Seeds often embedded in a scanty pulp, ovate or orbicular, compressed, the funicle filiform or variously expanded into a fleshy aril.—Species 120.—Tropics.

1. Corolla pale yellow or cream coloured .... 1. *P. bigeminum.*
2. Flowers white .... 2. *P. dulce.*

P. avaremotemo Mart. is used medicinally in Brazil, *P. dulce* Benth. in Guiana.

The bark of *P. Avaremotemo* Mart. (*Mimosa cochliacarpos* Gomes, *M. vaga* Velloso) is official in Portugal.

1. **Pithecellobium bigeminum** Mart. in Flora XX (1837) II. Beibl. 115 in obs.; Benth. in Hook. Lond. Journ. Bot. 3 (1844) 206.—PLATE 386 (under *Pithecellobium bigeminum*).

A middle sized unarmed tree; young parts glabrous or slightly pubescent. Leaves 2-pinnate; main rhachis 10-15 cm. long, glabrous, with a gland on the petiole and 1 below each pair or pinnae; pinnae stalked, 1-2 (rarely 3) pairs, the lowest pair the smallest, their rhachises with a gland beneath the insertion of each pair of leaflets except the lowest. Leaflets 1-2 (rarely 3) pairs, 7.5-15 by 2.5-3.8 cm.,

the terminal pair the largest, subcoriaceous, elliptic-lanceolate, or obovate-oblong, acuminate or acute; glabrous above, pubescent at first beneath, base acute; petiolules 3 mm. long. Flowers subsessile, in few-flowered heads in small peduncles clusters, arranged on the long branches of pubescent panicles usually shorter than the leaves. Calyx 2-2.5 mm. long, densely brown-silky; teeth short, triangular. Corolla pale yellow or cream-coloured, 2-3 times as long as the calyx, silky outside; lobes lanceolate, acute. Stamens 1-1.3 cm. long. Pods flat, once or twice spiral, bluntly pointed, roughish, but glabrous or nearly so, reddish brown outside, bright red within, not indented between the seeds. Seeds 5-8.

Distribution: Eastern Himalaya, Konkan, N. and S. Kanara, W. Ghats of Madras Presidency from Mysore to Anamalais and Travancore.

A decoction of the leaves is a medicine for leprosy.

A decoction of the leaves applied externally is used in Upper India as a nostrum for leprosy, and for promoting the growth of hair.

In Burma, the seeds are prescribed in the treatment of diabetes mellitus.

A laxative action of the bowels follows the ingestion of the seeds, with expulsion of much flatus. The breath and urine are rendered offensive. Sometimes alarming toxic symptoms are produced (E. J. Creais; *Ind. Med. Gaz.;* September, 1931).

A chemical examination of the leaves has been reported on by Chakravarti and Ganapati (20th Ind. Sc. Congress; Patna, 1933).

Bombay: Kachlora—; *Burma:* Danyinthi, Dhayinthi, Tanyen, Tanyenthi—; *Canarese:* Kadakonde, Kankarinje, Nuggikar—; *Hindi:* Kachlora—; *Lepcha:* Tikpikung—; *Malayalam:* Attapparanta, Kalpakku, Kaunatti, Kattukonna, Muttakkoluppan, Pannivaka, Varikiri—; *Sanskrit:* Aragvadha—; *Sinhalese:* Calateya—; *Tamil:* Kalaippakku—; *Tulu:* Kakke—.

2. **Pithecellobium dulce** Benth. in Hook. Lond. Journ. Bot. III (1844) 199.—*Inga dulcis* Willd. Sp. Pl. IV, 1005; Wight Ic. t. 198.

A tree 5-18 m. high, the ultimate branches often pendulous,

armed with short, sharp, stipular spines. Leaves evenly 2-pinnate, 4-8 cm. long; pinnae a single pair, each pinna bearing a single pair of oblique, ovate-oblong, obtuse, 1-4 cm. long leaflets. Flowers white, in dense heads about 1 cm. diam., their peduncles solitary or fascicled in the axils of small bracts, along the slender branchlets. Pod turgid, twisted, often spiral, 10-18 cm. long, about 1 cm. wide, dehiscent along the lower suture, the valves red when ripe. Seeds 6-8, surrounded by an edible, whitish, pulpy arillus.

Distribution: A native of tropical America.—Grown in India.

In Guiana, the bark is used as a febrifuge; the decoction is given as an enema.

Bombay: Chinch, Deccanibabul, Vilaitiyamli, Vilayatiyambi—; *Burma:* Kwaytanyeng, Kywetanyin—; *Canarese:* Simahunase—; *English:* Deccany Babool, Manilla Tamarind—; *French Guiana:* Griffes de chat, Ongles de chat, Z' ongchatte—; *Gold Coast:* Madras Thorn—; *Gujerati:* Ekadati, Vitayatiambli—; *Hindi:* Dakhanibabul, Vilaitiyimli, Vilatiimbi—; *Marathi:* Hatichinch, Vilayatichinch—; *Mexico:* Buamuchil, Cuamuchil, Guamuchil, Huamuchil—; *North-West Provinces:* Dakhinibabul—; *Tamil:* Karkapilli, Kattuppilli, Kodukkappuli, Konapuli, Korukapuli—; *Telugu:* Simachinduga, Simachinta—; *Uriya:* Simakoina—.

ROSACEAE.

Trees, shrubs or herbs. Leaves various, simple or compound alternate or rarely opposite, sometimes with glandular teeth; stipules mostly present and paired, sometimes adnate to the petiole. Flowers mostly actinomorphic and hermaphrodite; calyx free or adnate to the ovary; lobes mostly 5, imbricate, the fifth lobe adaxial. Disk lining the tube of the calyx. Petals the same number as the calyx-lobes, rarely absent, equal or rarely unequal, imbricate. Stamens

numerous, rarely definite or reduced to 1 or 2; filaments free, rarely connate; anthers small, 2-celled, opening lengthwise; carpels 1 or more, free or variously connate, often more or less adnate to the calyx-tube; styles free or rarely connate; ovules in each carpel 2 or more, superposed. Fruit superior or inferior, drupaceous, pomaceous, follicular or achenial, sometimes on an enlarged fleshy torus. Seeds without (very rarely with a little) endosperm.—Genera 100. Species 2,000.—Cosmopolitan.

A. Flowers regular. Carpel 1. Style subterminal rarely basal. Ovules 2, pendulous. Trees or shrubs with simple usually serrated leaves
- I. Calyx 5-lobed. Petals 5, large glabrous. Carpel solitary .. PRUNUS.
- II. Calyx 5-lobed. Petals 5. Carpel 1. Drupe inverted. Style subbasilar .... PRINSEPIA.

B. Flowers regular. Calyx ebracteolate. Stamens very numerous. Carpels many. Styles subbasal or ventral. Fruit of many dry or fleshy carpels, not included in the calyx-tube. Usually shrubs with often compound leaves .... RUBUS.

C. Flowers regular. Calyx usually bracteolate. Stamens usually numerous rarely few. Carpels 1 or more. Fruit of many achenes not included in the calyx-tube. Herbs or small shrubs with various leaves
- I. Calyx bracteolate. Stamens many. Styles elongated after flowering .... GEUM.
- II. Calyx bracteolate. Stamens 4 or more. Styles not elongating. Ripe carpels seated on an elevated dry receptacle .... POTENTILLA.

D. Flowers regular, sometimes apetalous. Stamens 1 or more. Carpels 2-3. Style terminal. Achene sunk in the calyx-tube. Herbs or small shrubs
- Calyx 5-lobed or spinous. Petals 5. Carpels 2-3. Ovule pendulous .... AGRIMONIA.

E. Flowers regular. Calyx-tube urceolate. Petals 5. Stamens very numerous. Carpels many, free. Ovule 1, pendulous. Achenes included in the fleshy calyx-tube. Shrubs; leaves compound .. ROSA.

F. Flowers regular. Calyx-tube becoming fleshy after flowering and enclosing the carpels. Stamens numerous. Ovules 2 or more, ascending. Fruit a pome, berry or a drupe with the 2 to 5 bony or coriaceous 1-2-seeded stones. Shrubs or trees
- I. Ovary 5-celled; cells 3- or more- ovuled
  - Cells of ovary many-ovuled .... CYDONIA.
- II. Ovary 2-5-celled; cells 2-ovuled
  - a. Flowers panicled. Ovary 5-celled .... ERIOBOTRYA.
  - b. Flowers corymbose or fascicled
    - 1. Ovary 5-celled. Fruit a pome or a berry .... PYRUS.
    - 2. Ovary 2-5-celled. Drupe with 2-5 bony stones. Leaves quite entire .... COTONEASTER.

This important Order contains the vast majority of fruits, a few medicinal, as well as a few poisonous plants.

Astringent, tonic, anthelmintic, and antiperiodic properties are found in the root, the bark, the leaves, and the flowers.

Among the substances isolated may be mentioned:—1. alcohols—benzyl, geraniol, kaempherol, mannitol—; 2. acids—citric, ellagic, gallic, hyrocyanic, kinovic, malic, tannic, tartaric—; 3. esters—methyl salicylate—; 4. sugars—dextrose—; 5. dyes—quercetin—; 6. glucosides—amygdalin, amygdonitrile, arbutin, cyanin, gein, keracyanin, laurocerasin, phloridzin, prulaurasin, prunasin, prunicyanin, prunitrin, quillaic acid, quillaic sapotoxin, sakuranin, serotin, sophorin—; 7. enrymes—emulsin—.

OFFICIAL:—*Agrimonia Eupatoria* Linn.=*A. officinalis* Lamk. (Portugal).

Amygdalus communis Linn. (Denmark, France, Portugal, Spain, United States); var. *amara* (Denmark, France, Norway, Portugal, Spain, United States); var. *dulcis* (Denmark, France, Portugal, Spain, United States); *A. Persica* Linn.=*Persica vulgaris* Mill. (Portugal).

Brayera anthelmintica Kunth. (Belgium, Hungary);=*Hagenia abyssinica* F. Gmel. (Italy)= *H. abyssinica* Lamk. (Portugal)= *H. abyssinica* Willd. (Spain).

Cerasus caproniana DC., *C. Juliana* DC. (France) *C. Lauro-cerasus* Loiss.=*Prunus Lauro-cerasus* Linn. (Spain).

Crataegus monogyna Jacq., *C. oxyacanthoides* Thuill. (France).

Cydonia vulgaris Pers. (France, Switzerland).

Filipendula Ulmaria (Linn.) Maximowicz=*Spiraea Ulmaria* Linn. (Switzerland).

Fragaria vesca Linn. var. *hortensis* Duch. (Portugal).

Geum urbanum Linn. (Denmark)=*Caryophyllata vulgaris* G. Bauh. (Portugal).

Hagenia abyssinica Gmelin (Germany, Turkey); *H. abyssinica* Willd. (Austria, France, Japan, Switzerland)=*Brayera anthelmintica* Kunth=*Bankesia abyssinica* Bruce (Hungary).

Potentilla erecta Hampe (Sweden); *P. silvestris* Necker (Germany, Switzerland); *P. Tormentilla* DC. (France).

Prunus Amygdalus Baillon var. *Amara* DC., var. *dulcis* DC. (Norway);—Stokes (Austria, Germany, Holland, Japan, Sweden); —var. *amara* Baill.,—var. *dulcis* Baill. (Great Britain);—var. *amara* DC.—var. *dulcis* DC. (Sweden);—var. *amara* Hayne, var. *dulcis* DC. (Hungary);—var. *α-amara* De Cand., var. *β-dulcis* Baillon (Portugal);—var. *amara* H. Bn. var. *dulcis* H. Bn. (Belgium);—var. *amara*=*Amygdalus communis* DC., *Prunus communis* Hook. & Benth., var. *dulcis*=*A. communis* DC., *P. communis* Hook. and Benth. (Russia);=*Amygdalus Communis* Linn. var. *dulcis* DC., var. *amara* DC. (Italy, Switzerland); *P. armeniaca* Linn. (Germany, Japan); *P. avium* Linn.=*Cerasus avium* Moench. (Portugal); *P. communis* Arcang. var. *dulcis* Schneid., var. *amara* Schneid. (Great Britain); *P. domestica* Linn. (Holland, Portugal); *P. Laurocerasus* Linn. (Belgium, France, Great Britain, Holland, Switzerland, Turkey)=*Cerasus Lauro-cerasus* Loiseleur (Portugal); *P. macrophylla* Linn. (Japan); *P. persica* Stokes (Germany); *P. serotina* Erhart (Great Britain, United States).

Pyrus cydonia Linn. (Belgium);—var. *minor* Brot.=*Cydonia vulgaris* Pers. (Portugal); *P. Malus* Linn. var. *Camoeza* and *Pero* Brot. (Portugal).

Quillaja saponaria Mol. (Austria, Belgium, Denmark, Germany, Great Britain, Hungary, Japan, Sweden, Switzerland); *Q. Smegmadermos* DC. (France).

Rosa spp. (Germany, Holland, Hungary, Japan, Sweden); *R. canina* Linn.=*R. hibernica* Smith (Portugal); *R. centifolia* Linn. (France, Portugal, Switzerland, United States); *R. damascena* Mill. (Denmark, France, Norway, Portugal, Russia, Sweden, Switzerland); *R. gallica* Linn. (Austria, Belgium, France, Holland, Italy, Russia, Spain, Switzerland, United States); *R. gallica* Linn. var. *plena* and var. *praenestina* Brot. (Portugal); *R. trigintipetala* Dieck. (Russia, Switzerland).

Rubus spp. (Italy); *R. fruticosus* Linn. (Italy); *R. Idaeus* Linn. (Belgium, Denmark, France, Germany, Hungary, Japan, Norway, Russia, Sweden, Switzerland)=*R. frambaesianus* Lamk. (Portugal); *R. Tokkura* Sieb. (Japan).

Sorbus domestica Linn.=*Pyrus Sorbus* Gaertn. (Portugal).

Spiraea ulmaria Linn. (Belgium)=*Ulmaria palustris* Moench. (Portugal).

Tormentilla erecta Linn.=*Potentilla Tormentilla* Nestler (Portugal).

PRUNUS (Tourn.) Linn.

Trees or shrubs mostly unarmed and deciduous. Leaves simple, entire or toothed; petiole often 2-glandular. Flowers white or pink, solitary, fascicled, corymbose or racemed. Calyx-tube various, partially or completely deciduous on fruit, lobes 5. Petals 5. Stamens usually 20. Carpel 1; style terminal; ovules 2, collateral, pendulous. Fruit a drupe with an indehiscent or 2-valved smooth or rugged stone, 1-seeded.—Species 85.—N. temperate, a few tropical.

A. Flowers solitary, fasciculate or umbellate, appearing before or with the leaves
  1. Stipules fimbriate .... 1. *P. amygdalus.*
  2. Stipules subulate, fimbriate .... 2. *P. persica.*
  3. Stipules lanceolate .... 3. *P. armeniaca.*
  4. Stipules linear, fimbriate .... 7. *P. communis.*
  5. Stipules pinnately or palmately divided the divisions linear, glandular-fimbriate .... 6. *P. cerasoides.*

B. Flowers solitary or umbellate, appearing after the leaves
  1. Producing root-suckers .... 4. *P. cerasus.*
  2. Not producing root-suckers .... 5. *P. avium.*
  3. Fruit globose or ovoid, drooping .... 9. *P. insititia.*
  4. Fruit dark blue, large .... 8. *P. domestica.*
  5. Drupes ovoid, cordiform .... 13. *P. triflora.*

C. Flowers in axillary or terminal many-flowered racemes. Leaves deciduous
  1. Drupe globose, 8 mm. diam., first red then dark purple or nearly black .... 10. *P. cornuta.*
  2. Drupe ovoid, 5 mm. long, seeded on the persistent calyx, red becoming black when ripe .... 12. *P. undulata.*
  3. Fruit small, ovate often mucronate .... 11. *P. mahaleb.*

This genus now includes the plums, almonds, peaches, apricots, and cherries. Therapeutically the fruits are used as mild laxatives, demulcents, and tonics; the barks are often bitter and antiperiodic.

The following are used medicinally in Europe —*P. amygdalus* Baill., *P. armeniaca* Linn., *P. avium* Linn., *P. cerasus* Linn., *P.*

chamaecerasus Jacq., *P. domestica* Linn., *P. insititia* Linn., *P. laurocerasus* Linn., *P. mahaleb* Linn., *P. padus* Linn., *P. persica* Stokes, *P. spinosa* Linn.—; in Armenia and the Caucasus—*P. divaricata* Ledeb., *P. domestica* Linn.—; in China—*P. amygdalus* Baill., *P. armeniaca* Linn., *P. communis* Huds., *P. japonica* Thunb., *P. mume* Sieb. & Zucc., *P. paniculata* Thunb., *P. persica* Sieb. & Zucc., *P. spinulosa* Thunb., *P. undulata* Ham.—; in Indo China—*P. armeniaca* Linn., *P. mume* Sieb. & Zucc., *P. persica* Stokes, *P. tomentosa* Thunb., *P. triflora* Roxb.—; in Malaya—*P. armeniaca* Linn., *P. japonica* Thunb., *P. mume* Sieb. & Zucc. *P. persica* Sieb. & Zucc.—; in North America—*P. serotina* Ehrh., *P. virginiana* Linn.—; in Mexico—*P. capollin* Zucc.—; in Brazil—*P. amygdalus* Baill., *P. brasiliensis* Schott., *P. laurocerasus* Linn., *P. persica* Stokes, *P. sphaerocarpa* Sw.—; in Transvaal—*P. persica* Stokes—.

P. laurocerasus Linn. contains the glucoside amygdalin which yields hydrocyanic acid. This acid is also found in the seeds of *P. americana* Marsh., *P. amygdalus* Baill., *P. armeniaca* Linn., *P. avium* Linn., *P. domestica* Linn., *P. insititia* Linn., *P. lusitanica* Linn., *P. padus* Linn., *P. serotina* Ehrh., *P. spinosa* Linn.

Official:—The seeds and oil of *Prunus amygdalus* Baillon var. *amara* DC., var. *dulcis* DC. (Norway);—Stokes (Germany, Holland, Japan, Sweden);—var. *amara* Baill., var. *dulcis* Baill. (Great Britain);—var. *amara* H. Bn., var. *dulcis* H. Bn. (Belgium); —var. *α-amara* De Cand., var. *β-dulcis* Baillon (Portugal);—var. *amara* Hayne, var. *dulcis* DC. (Hungary);—var. *amara* DC., var. *dulcis* DC. (Sweden);=*Amygdalus communis* Linn. var. *dulcis* DC. and *amara* DC. (Italy, Switzerland).

The seeds of *P. Amygdalus* Stokes var. *amara* and var. *dulcis* (Austria)=*Amygdalus communis* DC., *Prunus communis* Hook. and Benth. (Russia).

The oil from the seeds of *P. persica* Stokes (Germany), *P. communis* Arcang. var. *dulcis* Schneid. var. *amara* Schneid. (Great Britain).

The stem bark of *P. serotina* Ehrhart (Great Britain, United States).

The fresh leaves of *P. laurocerasus* Linn. (Belgium, France,

Great Britain, Holland, Switzerland, Turkey)=*Cerasus Lauro-cerasus* Loiseleur (Portugal); *P. macrophylla* Linn. (Japan).

The fresh fruit of *P. avium* Linn.=*Cerasus avium* Moench. (Portugal).

The dried fruit of *P. domestica* Linn. (Holland, Portugal).

The seeds of *P. armeniaca* Linn. (Japan).

1. **Prunus amygdalus** Baillon Hist. des pl. I, 415.—*Amygdalus communis* Linn. Sp. Pl. (1753) 473; Roxb. Fl. Ind. II (1832) 500.—Plate 388A.

A middle sized tree. Leaves greyish when full grown, oblong-lanceolate, serrulate; petiole equal to or longer than the greatest width of leaf; stipules fimbricate. Flowers white, tinged with red, appearing before the leaves from scaly buds on last year's wood; peduncles much shorter than the campanulate calyx. Drupe velvety, pericarp dry, when ripe separating into 2 valves; stone compressed with shallow wrinkles and minute holes.

Distribution: Indigenous in W. Asia and the Kuram Valley. Cultivated in Baluchistan, Kashmir and the Punjab, also in Afghanistan, Persia and the Mediterranean region.

The fruit is hot, oily, indigestible, aphrodisiac; removes "vata".—The seed is sweet, oily, aphrodisiac, laxative; removes "vata" and "pitta", causes "kapha"; good in leprosy.—The oil is laxative, aphrodisiac; cures headache, biliousness, "vata", burning sensation; causes urinary discharges (Ayurveda).

The sweet almond has a good flavour; tonic to the intestine, the brain, the body; good in complaints of the chest and the liver, cough, intestinal colic; aphrodisiac;—the pericarp strengthens the teeth if applied to them;—the oil is sweet, laxative; good for the brain, in delirium, in liver complaints; allays dry cough; clears the throat; cures colic.—The bitter seed has a bad taste; good in inflammation, ascites, headache, weakness of the eyes; used in bronchitis, old ulcers, scabies, hydrophobia;—the oil is laxative, insecticide, vulnerary; good for pain in the kidney, the liver, the spleen; used for gleet, earache, sore throat, cracked skin, and skin diseases (Yunani).

Almonds are recommended both internally and externally for

a variety of purposes. As a plaster made with vinegar, they are used to relieve neuralgic pains; as a collyrium, to strengthen the sight; in emulsion with starch and peppermint to allay cough. They are also considered to be lithontriptic and diuretic, and of use for removing obstructions of the liver and spleen; applied to the head, they kill lice; as a suppository, they relieve pain in difficult menstruation; as a poultice, they are a valuable application to irritable sores and skin eruptions.

The root of the tree is described as discutient and alterative; it is used both internally and externally.

The juice of almonds mixed with sugar is used in coughs. Almonds mixed with figs are used as a laxative and to relieve pain in the bowels.

Arabic: Louz, Lujaalhulu—; *Bengal:* Bilatibadam—; *Burma·* Badan—; *Canarese:* Badami—; *Catalan:* Ametlle—; *Chinese:* Pa Tan Hsing—; *Deccan:* Badam—; *Dutch:* Amandelboom—; *English:* Almond Tree—; *French:* Amandier, Amellié, Emmellié—; *German:* Mandebaum—; *Greek:* Amygdalia—; *Gujerati:* Badam—; *Hebrew:* Shaged—; *Hindi:* Badam—; *Hungarian:* Mandulafa—; *Italian:* Mandorlo—; *Konkani:* Amend, Amendi—; *Malayalam:* Badam—; *Malta:* Almond, Mandorlo, Lewza—; *Marathi:* Badam—; *Pab Hills:* Archin—; *Persian:* Badam—; *Polish:* Migdal—; *Portuguese:* Amendoeira—; *Punjab:* Badam—; *Roumanian:* Migdal—; *Russian:* Mindalnoi dyerevo—; *Sanskrit:* Badama, Badamitte, Netropamaphala, Suphala, Vatada, Vatavairi—; *Sinhalese:* Rattakotamba—; *Spanish:* Almendrew, Almendro—; *Surab:* Badam—; *Tamil:* Parsivadumai, Vadumai—; *Telugu:* Badamamu, Badamu, Parsibadami—; *Turkish:* Badam—; *Urdu:* Badamshirin, Badamtulkha—; *Uriya:* Badamo—; *Wad:* Kahero—.

2. **Prunus persica** Stokes Bot. Mat. Med. III (1812) 100.—*Amygdalus persica* Linn. Sp. Pl. (1753) 472.—Plate 390B.

A large deciduous shrub or small tree, twigs glabrous. Leaves conduplicate in bud, 6.3-10 cm. long, lanceolate, ovate-lanceolate or lanceolate-oblong, acuminate, usually hairy on the midrib beneath when young, serrate; petiole shorter than the greatest width of the

leaf, glandular or not; stipules subulate, fimbriate. Flowers pink, usually before, sometimes with the leaves, sessile or shortly pedicelled, mostly solitary on the previous year's wood. Calyx-tube campanulate, 3.8 mm. long, lobes woolly, equalling or exceeding the tube. Petals obovate, 2 cm. long. Stamens inserted at the mouth of the calyx-tube. Ovary and style hairy. Drupe downy, succulent, stone deeply furrowed.

Distribution: Probably indigenous in China. Commonly cultivated in W. Asia, Europe. Also in Baluchistan, in the Himalaya, Kunawar up to 10,000 ft., in the plains of N. India, in Manipur and Upper Burma.

The leaves are anthelmintic, insecticidal, vermicidal; used in leucoderma and in piles.—The flower is a galactagogue.—The fruit is of two kinds; aphrodisiac, antipyretic; tonic to the brain; enriches the blood; removes bad smell from the mouth and the sputum; useful in thirst, biliousness, and "kapha".—The oil from the seeds is abortifacient; good in piles, deafness, earache, stomach troubles of children (Yunani).

The fruit is given as a demulcent, an antiscorbutic, and a stomachic.

The natives of the Punjab believe the fruit to be useful as an ascaricide.

In Indo China, the bark is used in dropsy; the flowers are considered diuretic and laxative; the seeds are used as an anthelmintic and emmenagogue, and they are applied in the form of powder in pruritus vulvae.

In China and Malaya, peach kernels are given for coughs, blood diseases, rheumatism, and ague.

In Europe the bark and leaves are considered sedative, diuretic, and expectorant. For irritation and congestion of the gastric surfaces this has been found almost a specific. It is also used in coughs, whooping cough, and chronic bronchitis; preferably as an infusion.

An infusion of the leaf is administered in the Transvaal to girls in whom the inception of menstruation is delayed. The kernel oil is applied to impetigo.

Arabic: Khuj, Persik—; *Canarese:* Pichchisuhanne, Pichesu—;

Catalan: Alberguer, Presseguer, Melocotoner—; *Chaman:* Zargah—; *Chinese:* T'ao—; *Danish:* Persikketrae—; *Dutch:* Persikboom—; *English:* Peach Tree—; *French:* Pêcher—; *Garhwal:* Khirola—; *German:* Pfirsichbaum—; *Greek:* Persicamela, Rodakina—; *Hindi:* Aru—; *Hungarian:* Oszibarackfa—; *Indo China:* Dao—; *Italian:* Persico, Pesco—; *Japanese:* Fito momu—; *Kharan:* Halg—; *Kumaon:* Aru—; *Lepcha:* Takpo—; *Malaya:* Thow yan—; *Malta:* Peach, Persico, Pesco, Hauha—; *Mastung:* Shaftalu—; *Mexico:* Durazno—; *Nepal:* Aru—; *North-Western Provinces:* Aru, Rek—; *Persian:* Aru, Shuftalu—; *Pishin:* Shalil—; *Polish:* Broskvinia drzevo—; *Portuguese* Pecegueiro—; *Punjab:* Aor, Aru, Arui, Beimi, Bem, Bembi, Chimmanu, Katherti, Sunnu, Tsunu—; *Pushtu:* Ghargashtai, Ghwareshtai, Mandala, Mandata, Shaftalu—; *Quetta:* Shalil—; *Rajputana:* Aru—; *Roumanian:* Piersic—; *Russian:* Persikovoi dyerevo—; *Saora:* Pichesu—; *Spanish:* Alberchigo, Melocotonero—; *Sutlej:* Beim, Rek—; *Swedish:* Persiketraed—; *Turkish:* Rodakina—; *Urdu:* Adud—; *Uriya:* Pishu—; *Wad:* Shaftalu—.

3. **Prunus armeniaca** Linn. Sp. Pl. (1753) 474.—PLATE 389B.

A medium sized deciduous tree, twigs glabrous. Leaves convolute in bud, 5-7.5 by 3.8-5 cm., broadly ovate, acuminate, crenate-glandular, hairy on the nerves beneath when young, sometimes sparsely hispid above, when mature glabrous except for the axils of the nerves beneath; petiole about 2.5 cm. long, glandular; stipules lanceolate, glandular on the margins. Flowers pinkish at first then white, appearing before the leaves, solitary or fascicled; pedicels very short. Calyx-tube campanulate, puberulous, 5 mm. long; lobes rounded, pubescent, half the length of the tube. Petals suborbicular, 7.5-13 mm. long. Stamens inserted at the mouth of the calyx-tube. Ovary and base of the style hairy. Drupe downy or glabrous, yellow tinged with red, stone smooth with a thickened sulcate margin.

Distribution: Very likely indigenous in the Caucasian region. Commonly cultivated in Western and Central Asia and Europe, in Baluchistan up to 8,000 ft., in the N.-W. Himalaya, in W. Tibet to 12,000 ft. and in the Punjab plains.

The fruit is sweet, antidiarrhœal, antipyretic, emetic; allays thirst; bad for old people.—The seeds are tonic and anthelmintic; used in diseases of the liver, piles, earache, deafness (Yunani).

It is stated that apricots form antidotes to hill sickness. In Tibet, they are applied after mastication in ophthalmia; and Bellew mentions that the dried fruits are, in Afghanistan, used as a laxative and refrigerant in fevers, etc.

In Malaya, the dried fruits are eaten to quench thirst and allay fever.

Arabic: Binkuk, Kishanish, Tuffaurmena—; *Afghanistan:* Zardalu—; *Bhoti:* Chuli, Pating—; *Catalan:* Abricoquer—; *Chinese:* Hsing—; *Dutch:* Abrikoosboom—; *English:* Apricot—; *French:* Abricotier, Albericoque—; *German:* Aprikosenbaum—; *Hazara:* Hari—; *Hebrew:* Chhappuh—; *Hindi:* Chilu, Chulu, Chuari, Jaldaru, Khubani, Zardalu—; *Hungarian:* Sargabarackfa—; *Indo China:* Hanh, Mo, O mai—; *Italian:* Albercocco, Albicocco, Meliaco, Umiliaco—; *Kashmir:* Cherkish, Gurdalu, Iser—; *Kohlu:* Zardalu—; *Konkani:* Jardal—; *Kumaon:* Chola, Chuaru, Jaldaru, Kushmaru, Zardaru—; *Ladak:* Chuli—; *Malaya:* Pak hang—; *Malta:* Apricot, Albicocco, Berkuka—; *Mexico:* Albaricoque, Chabacano, Damasco—; *Nasirabad:* Zardalu—; *North-West Himalayas:* Chilu, Chuli, Shari—; *Persian:* Mishmish, Zardalu—; *Portuguese:* Damasco—; *Punjab:* Alukashmiri, Arti, Cherkush, Cheroli, Chir, Chiran, Chuli, Gurdalu, Hari, Harian, Jaldaru, Jaldaruchuli, Kishta, Kush, Mandata, Sari, Serkuji, Shari, Shiran, Zardalu—; *Pushtu:* Mandata, Nakhter—; *Quetta:* Zardalu—; *Roumanian:* Cais, Zarzar—; *Russian:* Abrikosovoi dyerevo—; *Shahrig:* Zardalu—; *Spanish:* Albaricoquero—; *Tibet:* Galdam—; *Urdu:* Khubani—.

4. **Prunus cerasus** Linn. Sp. Pl. (1753) 474.—PLATE 388B.

A deciduous shrub or small tree producing numerous root-suckers. Leaves conduplicate in bud, rather firm, shining, obovate, acuminate, serrate, glands usually on the margin of the blade close to the insertion of the petiole. Flowers in fascicles of 2-5 on slender pedicels 2-4 cm. long, flower-buds usually producing a few leaves

below the flowers. Calyx-lobes usually toothed. Corolla white or pink. Fruit globose, light red to nearly black, acid or sweet.

Distribution: Believed to be indigenous in W. Asia. Cultivated in N.-W. Himalaya.

The fruit is sour and sweetish; stomachic, purgative, tonic to the brain; used in diseases of the throat and the lungs; useful in thirst, vomiting, retching, biliousness.—The seed is diuretic, vulnerary, emmenagogue, laxative, antipyretic; used in gonorrhœa, strangury, chronic bronchitis; cures scabies, sore throat, liver complaints; stops chronic bronchitis; cures scabies, sore throat, liver compaints; stops

The bark which is bitter; is said to possess febrifugal properties. The Kernel is supposed to be a nervine tonic, and is used for the same purposes as hydrocyanic acid, of which it contains a considerable proportion.

Arabic: Farasia, Jerasayna, Kerasya—; *Catalan:* Cirer, Cirer moll, Cirer de cireras castaleras, Cirer de cireras duras, Cirerer, Guinder—; *Chinese:* Ying, T'ao—; *Dutch:* Karsseboom, Kerseboom—; *English:* Cherry Tree, Common Cherry, Dwarf Cherry, Sour Cherry, Wilol Cherry—; *French:* Cerisier, Gobet, Guin, Guindoux—; *German:* Amarelle, Ambrella, Ammer, Gartenkirsche, Glaskirsche, Kirschebaum, Maikirsche, Marille, Morelle, Morille, Sauerkirsche, Suesskirsche, Weichselkirsche—; *Greek:* Kerasia—; *Hungarian:* Cseresznyefa—; *Italian:* Ciliegio, Ciliegio montanaro, Ciriegio—; *Languedoc:* Cerié, Cerieis, Pichot—; *North-Western Provinces:* Alubalu—; *Persian:* Alubalu, Alubuali, Kilas—; *Polish:* Wisn—; *Portuguese:* Cerejeira—; *Punjab:* Gilas, Olchi—; *Roumanian:* Cires—; *Russian:* Vishennoi dyerevo—; *Spanish:* Cerezo, Cerezo comun, Cerezo durazno, Cerezo garrafal de cerezas costaleras, Cerezo garrafal de corazon de cabrito, Cerezo mollar, Guindo, Guindo comun, Guindo garrafal—; *Swedish:* Koersbaer—; *Urdu:* Alubalu—.

5. **Prunus avium** Linn. Fl. Suec. ed. II, 474.

Very similar to *P. cerasus* Linn. but larger and produces no root-suckers. Leaves flaccid, more coarsely serrate; petiole with 2 glands near the top. Flower-buds not bearing leaves but with

rather larger reflexed bud-scales. Calyx-lobes usually entire. Fruit nearly black, sweet, on peduncles up to 5 cm. long.

Distribution: Indigenous in Europe.—Cultivated in N.-W. India.

In Europe, the fruit stalks are considered tonic and astringent.

Catalan: Cirerer de bosch—; *English:* Wild Cherry-tree—; *French:* Cerisier merisier, Cerisier noir, Malagh, Merisier, Mersier—; *German:* Herzkirsche, Knappkirische, Knorpelkirsche, Suesskirsche, Vogelkirsche, Waldkirsche, Wilde Kirsche, Zurieselkirsche—; *Italian:* Durone, Visciolo—; *Kumaon:* Gilas, Krusbal—; *Roumanian:* Ciresul paserilor—; *Russian:* Chereshanya—; *Spanish:* Cerezo de aves, Cerezo de monte, Cerezo negro—.

6. **Prunus cerasoides** D. Don Prodr. Fl. Nep. 239.—*P. puddum* Roxb. ex Wall. Pl. As. Rar. II, 37.—PLATE 389A. (under *P. puddum*).

A middle sized or large tree, bark peeling off in horizontal strips, wood pale red. Leaves glossy, nearly glabrous, ovate, long-acuminate, sharply serrate, blade 7.5-12.5 cm., petiole 1.3 cm. long, 1 or more conspicuous glands on the petiole; stipules pinnately or palmately divided, the divisions linear, glandular-fimbriate. Flowers white, pink or crimson, appearing before the leaves, in umbellate fascicles, approximate near the ends of branchlets; pedicels slender, as long as or longer than the calyx. Calyx turbinate, lobes ovate, acute. Fruit yellow and red, ovoid or globose, 1.3-2 cm. long, acid, somewhat astringent; stone ovoid, rugose and furrowed, supported by the calyx-base, from which the tube separates after flowering.

Distribution: Outer Himalaya from the Sutlej to Sikkim, mostly between 2,500 and 7,000 ft., Khasia Hills, Manipur, Upper Burma, 4,600 ft. Often cultivated.

The stem is bitter, acrid; antipyretic, refrigerant, vulnerary; causes flatulence; cures leprosy, hallucinations, burning of the body, leucoderma, erysipelas; useful in vomiting, thirst, hiccough, asthma; prevents abortion (Ayurveda).

The kernel is used in stone and gravel. The bark contains amygdalin, and the smaller branches are sold in the bazaars as substitutes for hydrocyanic acid in native practice.

The stem in combination with other drugs is prescribed for snake-bite (Charaka, Sushruta, Sharangdharasamhita) and scorpion-sting (Sushruta).

The stem is not an antidote to snake- (Mhaskar and Caius) or scorpion- (Caius and Mhaskar) venoms.

Bombay: Padmakasta—; *Burma:* Panni—; *English:* Himalayan Cherry—; *Gujerati:* Padmak, Padmakathi—; *Hindi:* Padam, Paddam, Padmakashtha, Pajia, Paya, Phaja—; *Jaunsar:* Phaja—; *Kumaon:* Padam, Paddam, Paiya, Puya—; *Lepcha:* Kongki—; *Marathi:* Padmaka, Padmakastha—; *Nepal:* Paiyung—; *Punjab:* Amalguchh, Chamiari, Paddam, Paja, Pajia, Pajja—; *Sanskrit:* Charu, Hima, Kaidara, Kedaraja, Malaya, Maleya, Padmagandhi, Padmaka, Padmakashtha, Padmaksha, Padmavhaya, Padmavriksha, Patalapushpavarnaka, Patalaputrasanibha, Pita, Pitaka, Pitarakta, Rakta, Shitala, Shitavirya, Shubha, Sugrabha—.

7. **Prunus communis** Hudson Fl. Angl. ed. II. I, 212. —PLATE 391A.

A shrub or middle sized tree, unarmed or spinescent; young shoots pubescent. Leaves ovate or ovate-lanceolate, serrate, more or less pubescent beneath along the nerves, petioles shorter than the greatest breadth of leaf; stipules linear, fimbriate. Pedicels slender, 3 or 4 times the length of the calyx, solitary or fasciculate from lateral often leaf-bearing buds, calyx-tube campanulate. Drupe globose or oblong, pericarp fleshy.

Distribution: Indigenous in Europe and W. Asia. Cultivated in Kashmir and the Punjab plains.

The Bokhara Plum is a good substitute for the Prune of Europe.

The fruit is sub-acrid, cold, and moist; digestive and aperient; useful in biliousness and heat of the body (Yunani).

The root is considered astringent.

Arabic: Barkuk—; *Armenian:* Dambut—; *Bhagwana:* Aru—; *Canarese:* Alubokara—; *Catalan:* Pruner—; *Chinese:* Li—; *English:* Plum Tree—; *French:* Arantze, Bois satiné, Prunier—; *Georgian:* Kliavi—; *German:* Pflaumenbaum, Zevetschebaum—; *Greek:* Kokkymilia—; *Hindi:* Alubukhara, Alucha—; *Hungarian:*

Szilva—; *Italian:* Prugno, Susino—; *North-Western Himalayas:* Alucha—; *Pishin:* Alucha—; *Polish:* Slivina—; *Portuguese:* Amexieira—; *Quetta:* Alubokhara, Alubukhara, Alucha—; *Roumanian:* Perj, Prun—; *Spanish:* Cirolero, Ciruelo—.

8. **Prunus domestica** Linn. Sp. Pl. (1753) 475.—Plate 390A (under *P. communis* var. *domestica*).

A tree, unarmed; branches glabrous; pedicels in pairs, pubescent; drupes large, oblong, drooping.

Distribution: Native country unknown, but of Europe or the Eurasian region. Run wild in many regions of the world. Kashmir.—Afghanistan.

The fruit is laxative and refrigerant.

Prunes are often added to cathartic decoctions, improving their flavour and promoting their effect. They are also given in combination with other drugs in leucorrhœa, irregular menstruation, and in debility following miscarriage.

Catalan: Pruner—; *Danish:* Blommer—; *Dutch:* Pruimboom—; *English:* Plum Tree, Prune Tree—; *French:* Prunier, Prunier commun—; *Georgian:* Kliavi—; *German:* Pflaumenbaum, Zwetschebaum—; *Greek:* Kokkymilia—; *Hungarian:* Szilvafa—; *Italian:* Prugno, Susino—; *Madagascar:* Pesombazaha—; *Malta:* Plum, Pruno, Susino, Pruna—; *Portuguese:* Amexieira—; *Roumanian:* Perj, Prun—; *Russian:* Slivnoi dyerevo—; *Spanish:* Cirolero, Ciruelo—; *Swedish:* Plommon—.

9. **Prunus insititia** Linn. Cent. Pl. I, 12.—*P. domestica* subsp. *insititia* Schneid.—Plate 391B.

A shrub with straight branches, sometimes spinescent; branchlets velvety. Leaves pubescent beneath; pedicels in pairs, downy. Drupes middle sized, globose, 1.8-2.5 cm. diam., drooping.

Distribution: Europe, N. Africa.—Himalayan region.

The fruit is of five kinds. The unripe fruit is sour, sweet; cooling, astringent to the bowels, cardiotonic, stomachic, indigestible; removes "kapha" and biliousness; cures urinary discharges, piles, tumours, gout.—The ripe fruit is sweet; heating, aphrodisiac, anti-

pyretic; cures urinary discharges and piles; causes "kapha" and biliousness(Ayurveda).

The leaves purify the blood; stop nasal hæmorrhage, inflammation of the palate; good in cough.—The fruit is sour, sweet; laxative, antipyretic; cures boils, scabies; good for cold in the head; lessens bronchitis, headache, thirst, vomiting, biliousness (Yunani).

The properties are the same as those of *P. communis* and *P. domestica*.

Arabic: Ahasa—; *Bombay:* Alubokhara—; *English:* Bullace—; *Hindi:* Alubokhara—; *Malta:* Bullace, Wild Damson, Prugnola da siepe, Pruno, Prajn, Pruna—; *Marathi:* Viraruruka—; *Mexico:* Ciruela de Espana, Ciruelo de Espana—; *Persia:* Alubokhara—; *Sanskrit:* Aluka, Aruka, Bhalla, Bhalluka, Raktaphala, Vira, Viraruka, Virasena—; *Urdu:* Alubokhara—.

10. **Prunus cornuta** Wall. Cat. (1828) n. 716.—*P. Padus* Linn. Sp. Pl. (1753) 473.—PLATE 392B.

A medium sized deciduous tree, twigs glabrous or very finely pubescent. Leaves conduplicate in bud, 10-15 cm. long, oblong-lanceolate or oblong-ovate, acuminate, base cordate or rounded, closely serrate, puberulous on the nerves above, glaucescent beneath with red midrib and main lateral nerves bearded in the axils; petiole 2.5-3.8 cm. long, red, usually with a pair of glands near the top; stipules 1.3-2 cm. long, linear, fimbriate. Flowers white, in terminal or axillary drooping racemes 10-15 cm. long, rhachis and pedicels pubescent or nearly glabrous, the latter about 5 mm. long. Calyx-tube hemispheric; lobes small, rounded, toothed. Petals 3.8 mm. long, orbicular, concave. Stamens shorter than the petals, inserted on an annular disk. Ovary and style glabrous. Drupe globose, 1 cm. diam., red or nearly black when ripe, stone thick, rugose.

Distribution: Kuram Valley, Trans-Indus, Himalaya, Hazara to Sikkim, 4,000—10,000 ft.—From N. and Central Europe through W. Asia and Siberia to Amur land and Kamtchatka.

The oil from the kernels is a good substitute for oil of bitter almonds.

Catalan: Cirer bort—; *English:* Bird Cherry—; *French:* Bois

puant, Cerisier ă grappes, Flairan bois, Laurier Putiet, Merisier ă grappes, Pade, Pultier, Putier, Putiet, Faux bois de Sainte Lucie—; *German:* Ahlkirsche, Alzkrische, Elexen, Elfenbaum, Elsebeerbaum, Elsebeere, Elsen, Faulbaum, Faulbeerbaum, Faulkirsche, Hexenbaum, Kirsche, Maibaum, Pabstweide, Traubenkirsche, Vogelkirsche—; *Hazara:* Kalakat—; *Hindi:* Jamana—; *Italian:* Pado—; *Jaunsar:* Jamnoi, Jamoi, Jamroi—; *Kashmir* Jaman, Zambchule—; *Kumaon:* Bombaksing, Bombali, Jamana, Jamun, Jamuna—; *Lepcha:* Hlosa, Hlotkung—; *Nepal:* Arupatti, Likharu—; *North-West Himalayas:* Jamoi, Jamu, Jamun—; *Punjab:* Bart, Chule, Dudla, Gidardak, Jammu, Jamna, Jamu, Jamun, Kalakat, Krun, Paras, Zam, Zambu, Sum—; *Russian:* Tcheryomukha—; *Spanish:* Cerezo de racimo, Falso cerezo de Santa Lucia—.

11. **Prunus mahaleb** Linn. Sp. Pl. (1753) 474.

Shrubby, very much branched; branches erect, spreading. Leaves somewhat long-ovate, subrotund-ovate, shortly acuminate, often subcordate, obtusely serrate. Flowers forming simple convex corymbs, white. Fruit small, ovate, often mucronate.

Distribution: Baluchistan.—Indigenous in Europe and W. Asia.

The leaves and stem are insecticides; they remove bad odour due to perspiration.—The fruit is bitter, with a strong pleasant smell; tonic to the brain and the chest, analgesic, emmenagogue, anthelmintic, aphrodisiac; good for the lungs; used in asthma, scabies; lessens all inflammations (Yunani).

In North-West India, the scented kernels are used as a substitute for hydrocyanic acid.

The fruit is prescribed in snake-bite (Charaka, Sushruta, Vagbhata) and scorpion-sting (Charaka, Sushruta).

The fruit is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Mahalib—; *Bombay:* Gahula, Gavala—; *Catalan:* Cirer de Santa Llussia—; *French:* Amarel, Bois de mahaleb, Bois de sainte Lucie, Cerisier mahaleb, Kneut, Malague, Malagué, Prunier odorant, Prunier de sainte Lucie, Quenot, Sainte Lucie—; *Malta:* Mahalep Cherry, Ciliegio canino—; *Persian:* Paiwandimiryam—;

Sanskrit: Priyunger—; *Sind:* Mahalib—; *Spanish:* Cerezo de Mahoma, Cerezo de Santa Lucia—; *Urdu:* Khewati—.

12. **Prunus undulata** Ham. in Don Prodr. 239.

A medium sized deciduous tree with rounded crown attaining 1.8 m. girth and 15 m. high. Bark rough, dark grey or blackish, often with conspicuous raised circular lenticels and exfoliating in small woody scales. Blaze 1-1.3 cm., strongly reticulate-fibrous, pale yellowish- or pinkish- brown rapidly turning reddish-brown on exposure. Leaves 7.5-11.5 by 2.5-4.5 cm., oblong or elliptic, usually widening upwards, acuminate, base rounded, closely and shallowly apiculate-crenate, glabrous except for tufts of hairs in the lower nerve-axils beneath, secondary nerves 8-12 pairs. Petiole 7.5-13 mm. long, usually, if not always, without glands. Flowers 7.5-10 mm. diam., white, in solitary erect racemes 5-12.5 cm. long on the old wood in the axils of leaf-scars. Pedicels 2.5-3.8 mm. long. Rhachis and pedicels pubescent. Drupe ovoid, 5 mm. long, seated on the persistent calyx, red becoming black when ripe.

Distribution: Kumaon, 6,000—8,000 ft., Nepal, Sikkim, 8,000—12,000 ft., Bhutan, Khasia Hills.

The kernels contain an oil similar to that of bitter almonds.

Almora: Aruwa—; *Garhwal:* Aria, Gadharu—.

13. **Prunus triflora** Roxb. Hort. Beng. (1814) 38.

A small bushy tree, all parts glabrous; bark smooth, blackish. Leaves obversely lanceolate, 2-glandular at the acuminate base, on a slender petiole about 1.3 cm. long, shortly acuminate, minutely crenulate, 5-7.5 cm. long, membranous, glabrous; stipules lanceolate, glandular-fringed. Flowers rather small, white, on slender glabrous pedicels 1.3 cm. long, usually arising by threes from every leaf-bud; calyx glabrous, the tube turbinate, the lobes longer than the tube, more than 2 mm. long, ovate, acute, glandular on the margins; petals 8 mm. long, broadly oboval, very shortly clawed; filaments about 30; stigma large. Drupes cordate-ovoid, the size of a plum, dark purple, pruinose, grooved on one side, the pulp pale reddish yellow.

Distribution: Ava Hills.—China.

In Indo China, the fruit is considered stomachic, and good for allaying thirst; it is given in arthritis.

Indo China: Ly, Man, Prunier annamite—;

Prinsepia Royle.

A glabrous spinous shrub. Leaves deciduous, lanceolate or obovate; stipules minute, deciduous. Flowers in short axillary recemes on the sides of the spines. Calyx persistent, tube cupular; lobes 5, unequal, orbicular, imbricate in bud. Petals 5, orbicular, shortly clawed. Stamens numerous, many-seriate, inserted on the mouth of the calyx-tube, filaments short; anther-cells often unequal, separated by a broad connective. Carpel 1, sessile; style basal, ascending, stigma capitate; ovules 2, collateral, pendulous. Drupe obliquely ellipsoid or cylindric, with the remains of the style at its base; epicarp thin; stone coriaceous, smooth. Seed erect, cotyledons amygdaloid, radicle inferior.—Species 3, two in Mongolia and N. China, one in British India.

The genus is therapeutically inert.

1. **Prinsepia utilis** Royle Illustr. Bot. Himal. (1839) 206, t. 38, fig. 1.—Plate 392A.

A deciduous shrub, branches green, armed with stout axillary thorns, the youngest shoots only pubescent, thorns often 3.8 cm. long and leaf-bearing. Leaves 2.5-7.5 cm. long, lanceolate, narrowed at both ends, minutely serrate, coriaceous, glabrous; petiole 5-13 mm. long; stipules 5 mm. long, linear, caducous. Flowers 7.5-10 mm. across, white, in short axillary racemes; pedicels 5-13 mm. long; bracts linear or ovate, small. Calyx cup-shaped, persistent; lobes 5, unequal, orbicular, imbricate in bud, reflexed after flowering. Petals 5, orbicular, shortly clawed. Stamens numerous, many-serrate, inserted on the mouth of the calyx-tube; filaments short; anther-cells unequal, separated by the broad connective. Carpel 1, sessile at the base of the calyx-tube; style short, thick; ovules 2, collateral. Drupe 1.3-1.8 cm. long, oblong-cylindric, fleshy, purple when ripe, the style scar subbasal, endocarp coriaceous, smooth, seed 1.

Distribution: Outer Himalaya from Hazara to Bhutan, 2,000—9,000 ft., common on dry slopes, Khasia Hills.

This shrub yields an oil, used as a rubefacient and as an application in rheumatism and pains from over-fatigue (Atkinson).

Garhwal: Bhekal, Bhekar—; *Hazara:* Phulwari—; *Hindi:* Bekkra, Bhekal, Cherara, Dhatila, Jhatela, Karanga—; *Jaunsar:* Bhek, Bhekoi—; *Kumaon:* Bhekala, Bhekara, Bhekla, Chirara, Dhatela, Dintili, Jhatela, Phalawa—; *North-Western Himalayas:* Bekhar, Bhekal—; *Punjab:* Arund, Behkul, Bekkli, Bekrul, Bhekal, Chamba, Garandu, Gurinda, Jinti, Kharngura, Phulwara, Tatua—.

RUBUS Linn.

Suberect or sarmentose prickly shrubs. Leaves alternate, simple or compound; stipules free or adnate to the petiole. Flowers in terminal and axillary corymbose panicles (rarely solitary), white or red. Calyx persistent; tube broad; lobes 5. Petals 5. Stamens usually indefinite, inserted at the mouth of the calyx; filaments filiform. Disk lining the calyx-tube. Carpels many, on a convex receptacle; ovules 2, collateral, pendulous; style subterminal. Fruit of numerous small 1-seeded drupes crowded upon a dry spongy conical or cylindric receptacle. Seed pendulous.—Species 225.—Cosmopolitan, especially N. temperate.

Leaves simple, undivided or lobed .... 1. *R. moluccanus.*
 1. Stem slender, creeping or prostrate. Leaves pinnately trifoliolate .... 2. *R. saxatilis.*
 2. Stem erect sarmentose or climbing .... 3. *R. fruticosus.*

Powerfully astringent and tonic.

The following species are used medicinally in Europe—*R. caesius* Linn., *R. chamaemorus* Linn., *R. fruticosus* Linn., *R. idaeus* Linn., *R. microphyllus* Linn. f., *R. thunbergii* Sieb. & Zucc.—; in Indo China—*R. buergeri* Miq., *R. cochinchinensis* Tratt., *R. idaeus* Linn., *R. incisus* Thunb., *R. moluccanus* Linn., *R. parvifolius* Linn., *R. rosaefolius* Sm., *R. tokkura* Sieb.—; in La Reunion—; *R. borbonicus* Pers., *R. moluccanus* Linn., *R. rosaefolius* Sm.—; in Madagascar—*R. apetalus* Poir., *R. pauciflorus* Baker, *R. rosaefolius* Sm.—; in Brazil—*R. brasiliensis* Mart., *R. jamaicensis* Linn.—; in North

America—*R. alleghaniensis* Porter, *R. canadensis* Linn., *R. cuneifolius* Pursh., *R. occidentalis* Linn., *R. villosus* Ait.—; in South Africa—*R. ludwigii* E. & Z., *R. pinnatus* Willd., *R. rigidus* Sm.—.

OFFICIAL:—The fruit of *Rubus spp.* (Italy); *R. fruticosus* Linn. (Italy); *R. idaeus* Linn. (Belgium, Denmark, France, Germany, Hungary, Japan, Norway, Russia, Sweden, Switzerland)=*R. frambaesianus* Lamk. (Portugal); *R. tokkura* Sieb. (Japan).

1. **Rubus moluccanus** Linn. Sp. Pl. (1753) 1197.—PLATE 393.

An extensive subscandent shrub; young branches villous with yellowish hairs; prickles short, recurved, scattered over the branches, petioles and lower surfaces of the midribs of the leaves. Leaves about as broad or (not infrequently) broader than long, 7.5-15 cm. diam., palmately 5-7-lobed (the lobes obtuse or subacute), irregularly and finely serrate-dentate, bright green, rugulose and sparsely hispid above, clothed with soft yellowish tomentum, reticulately and prominently veined beneath, base deeply cordate; main nerves often prickly beneath; petioles 2.5-6.3 cm. long, densely fulvous-hairy; stipules usually large, toothed, pinnatifid or laciniate, densely silky-hairy. Flowers in terminal and axillary silky panicles usually shorter than the leaves; peduncles stout; pedicels short, fulvous-silky; bracts pectinate. Calyx densely silky; lobes more or less triangular, entire or pectinately toothed at the apex. Petals white, obovate, shorter than the calyx. Fruit globose, succulent, the individual carpels red, the receptacle hairy.

Distribution: W. Ghats, Central, Eastern and tropical Himalaya, Nepal, Sikkim, Burma, Assam, Ceylon.—Malaya.

The fruit is considered by the Malayans a valuable remedy for the nocturnal micturition of children and the leaves a powerful emmenagogue and abortifacient (Rumphius).

In La Reunion, the leaves are used as an astringent.

Kumaon: Katsol—; *La Reunion:* Grosse framboise marronne, Grosse ronce, Vigne marronne—; *Lepcha:* Sufokji—; *Nepal:* Bipemkanta—; *Sinhalese:* Welbute—.

2. **Rubus saxatilis** Linn. Sp. Pl. (1753) 494.

Eglandular, glabrous or slightly pubescent; stems annual from a stout woody rhizome, short, erect; prickles few, slender, straight. Leaflets 3, rhombic-ovate, somewhat lobed, acutely doubly-toothed, 5-7.5 cm. long, membranous, the lateral subsessile with cuneate bases and often lobed outer margin. Petiole very slender, 7.5-12.5 cm.; stipules linear or linear-oblong. Flowers 1.3 cm. diam., 1-4, shortly pedicelled on the top of a slender axillary peduncle. Calyx unarmed, lobes ovate-lanceolate, acute, longer than the narrow petals, erect in fruit. Petals white, small, slender, carpels few, glabrous. Fruit with a few large scarlet drupes. Stone reticulated.

Distribution: W. temperate Himalaya in the Tibetan region, from Kashmir to Kumaon, 10,000—11,000 ft.—Caucasus and westwards to the Atlantic, Siberia, Dahuria.

A fairly good substitute for *R. fruticosus.*

English: Stone Bramble—; *French:* Ronce des rochers—.

3. **Rubus fruticosus** Linn. Sp. Pl. (1753) 493.

A suberect rambling shrub, twing angular, tomentose; prickles stout, recurved, extending to the petioles and inflorescence, glands and bristles 0. Leaves 5-15 cm. long; petiole stout, tomentose, not channelled; stipules 5 mm. long, subulate, velvety. Leaflets usually 3, often 1 towards the tips of the shoots, sometimes 5 towards the base, either pinnately or pedately arranged, the lateral 2.5-5 cm. long, shortly petiolulate, oblique, ovate, elliptic or obovate, the terminal orbicular or obovate; all rather thick, minutely pubescent above, grey beneath with dense short tomentum, simply or doubly serrate, nerves prominent beneath. Flowers pink, 7.5-18 mm. across, in terminal panicles; pedicels 7.5-18 mm. long, velvety; bracts persistent, linear, velvety, often bi- or tri- fid. Calyx velvety, tube short; lobes 6 mm. long, reflexed in fruit. Petals obovate, exceeding the sepals. Fruit 7.5 mm. diam., black, glabrous, slightly succulent, drupelets many; receptacle deciduous.

Distribution: W. temperate Himalaya 3,000—7,000 ft.—Afghanistan and westwards to the Atlantic.

Blackberry is a household remedy in Europe. Blackberry wine and Blackberry jam are taken for sore throats in many rustic homes

in England. An infusion of the leaves is taken to stay diarrhœa, and for some bleedings. A decoction of the root or of the bark, and also the powdered fruit are efficacious remedies for relaxed bowels and dysentery. The decoction of the root is also useful against whooping-cough in its spasmodic stage. Blackberry wine is a trustworthy cordial astringent remedy for looseness of the bowels.

Catalan: Esvarse—; *Dutch:* Braambes, Braambezie—; *English:* Blackberry, Bramble, Brimmle, Broomles, Brumble, Brumbleberries, Brumbley-berry Bush, Brummel, Brummelkites, Brymble, Bullbeef, Bumbleberries, Bumblekites, Bumly Kites, Bummell, Cock-bramble, Cock-brumble, Country Lawyers, Ewe Bramble, Gaitberry, Gaiter-tree, Garten Berries, Hawk's Bill Bramble, Lady's Garters, Land Briars, Lawyers, Mooches, Mulberry, Mulberry Bramble, Scaldberry, Thet-thorne, Thevethorn, Thilf—; *French:* Ampomelle, Aronce, Catimuron, Catins meurons, Meuron, Mûre à pous Mûre de haie, Mûre de renard, Mûre sauvage, Murier des haies, Murier de renard, Murier sauvage, Muron, Ronce, Ronce des bois, Ronce des haies, Ronce de saint François, Ronce commune, Ronce noire, Ronce sauvage—; *German:* Braunbeere, Schwarze Brombeere, Rohmbeere, Schwarzbeere—; *Irish:* Dris—; *Italian:* Rovo—; *Languedoc:* Roumego, Roumi—; *Malta:* Blackberry, Rogo, Rovo, Ghollick—; *Mexico:* Zarzamora—; *Portuguese:* Amoras de silveria—; *Punjab:* Akhi, Alish, Chench, Kanachi, Pakhana, Shalidagganch—; *Roumanian:* Maraeine, Mur—; *Russian:* Ejevika, Moroshka, Tennovie kust—; *Sakalave:* Roimainty—; *Spanish:* Zarza, Zarzamora—; *Trans Indus:* Karwarei—.

Geum Linn.

Erect perennial herbs. Radical leaves crowded, pinnate; terminal leaflet large; stipules adnate to the petiole. Flowers solitary or corymbose, white yellow or red. Calyx persistent, 5-bracteolate; lobes 5, imbricate or valvate. Petals 5. Stamens very many, crowded. Disk smooth or with radiating grooves. Carpels many, on a long or short receptacle; style filiform, elongating much after flowering, straight or bent; ovules ascending. Achenes many, on a

dry receptacle, each with a long filiform straight or bent terminal style which is often hooked at the tip.—Species 40.—N. and S. temperate, arctic.

1. Style in fruit hooked at the tip or below it .... 1. *G. urbanum.*
2. Style straight in fruit .... 2. *G. elatum.*

Astringent, tonic, stimulant; useful in diarrhœa.

The following are used medicinally in Europe—*G. montanum* Linn., *G. rivale* Linn., *G. urbanum* Linn.—; in Indo China and China —*G. japonicum* Thunb.—; in North America—*G. album* J. F. Gmel., *G. rivale.* Linn., *G. urbanum* Linn., *G. virginianum* Linn.—.

OFFICIAL:—The root of *G. urbanum* Linn. (Denmark)= *Caryophyllata vulgaris* G. Bauh (Portugal).

1. **Geum urbanum** Linn. Sp. Pl. (1753) 501; Blatter Beautiful Fl. Kashmir I (1927) 103, pl. 20, fig. 5.—PLATE 394B.

A perennial herb. Stems 30-90 cm. high, erect, from a woody rootstock, sparsely softly hairy. Radical leaves long-stalked, with lobes each side of a common stalk, the end-leaflet large, rounded, scalloped, lobed, the lateral ones stalkless, oblong. Stem-leaves made up of 3 leaflets, variable. Stipules large, lobed and cut. Flowers small, 1.3-2 cm. diam., pale yellow, erect. Calyx-lobes bent back. Style sharply bent inwards, jointed near the middle, lower portion hairless, becoming elongated and hooked in fruit, end-portion hairy, finally breaking off. Petals spreading, inversely ovate. Fruit a globose head of densely hairy achenes.

Distribution: Temperate W. Himalaya, 6,000—11,000 ft., from Kashmir to Kumaon. —Siberia and westwards to the Atlantic, New Zealand.

In Europe, the roots are considered astringent and antiseptic. They are given in infusion for ague, and as an excellent cordial sudorific in chills, or for fresh catarrh.

The whole herb is astringent, styptic, tonic, febrifuge, stomachic. Its constant use is said to have a highly restorative power in weakness, debility, etc. It is also useful in diarrhœa, sore throat, and leucorrhœa.

The root of the Herb Bennett contains eugenol, a glucoside "gein," and an enzyme "gease" (*Journ. Chem.* Soc., 1905).

Danish: Nellikerod—; *Dutch:* Gemeen nagelvortel, Gezegendkruid, Nagekruid—; *English:* Avens, Blessed Herb, Herb Bennet, Way Bennet, Wild Rye, Wood Avens—; *French:* Benoite, Bennoite, Canonica, Flumatique, Galiote, Galliot, Galliote, Gariot, Grippe, Herbe bénite, Herbe de saint Benoit, Racine giroflée, Recise, Sanicle des montagnes—; *German:* Allerweltheil, Allerwertheilkraut, Benediktennaegleinwurz, Benediktenwurz, Caraffelwurz, Eisenkrautwurzel, Garaffel, Garaggelwurz, Hasenauge, Heil aller Welt, Igelkraut, Karniffelwurzel, Maerzkraut, Maerzwurzel, Mannsgrab, Meerwurz, Nagelkraut, Naegeleinkraut, Naegelichrut, Nardenwurzel, Negewurz, Nelkenwurz, Paradieswurzel, Sanamundenkraut, Sankt Benediktskraut, Stulkenwurz, Weinwurzel—; *Italian:* Ambretta, Cariofillata, Gariofillata, Erba benedetta, Herba benedicta—; *New Zealand:* Kopata—; *Polish:* Zarzyczka—; *Portuguese:* Cravoila, Cravolha, Herva benta—; *Roumanian:* Cuisorita—; *Russian:* Geozditchney Koren, Grebnik—; *Spanish:* Cariofilata oficinal, Islera, Yerba de San Benito—.

2. **Geum alatum** Wall. Cat. n. 711; Blatter Beautiful Fl. Kashmir I (1927) 103, pl. 20, fig. 6 and 7.—PLATE 394A.

A perennial herb. Stems 30-45 cm. high from a stout woody rootstock. Radical leaves pinnately cut, 10-30 cm. long. Segments crenate or sharply toothed, often lobed; lateral segments many, nearly or quite distinct, with a broad base, stalkless, ovate or oblong, up to 2.5 cm. long, pairs alternately large and small, gradually diminishing in size from the uppermost downwards, end-segment much larger, 3-lobed. Stem-leaves few, small, pinnately lobed. Flowering-stems with few leaves and 1-6 flowers. Flowers 2.5-3.8 cm. diam. Calyx-lobes triangular ovate, silky, spreading in fruit. Petals rounded, bright yellow, much longer than the calyx. Style hairless, nearly straight, simple, not jointed or hooked in fruit.

Distribution: Subalpine and alpine Himalaya, from Kashmir 9,000—12,000 ft., to Sikkim, 12,000—15,000 ft.

According to Honnigberger the root of this plant, officinal in Kashmere, is one of the most valuable of remedies. Its uses are similar to those of *G. urbanum.*

Kashmere: Gogjemul—; *Persian:* Gunglujungli—.

POTENTILLA Linn.

Annual or perennial herbs, undershrubs or rarely small shrubs. Leaves deciduous, compound, 3-foliate, digitate or pinnate; stipules adnate to the base of the petiole. Flowers white or yellow, rarely red, bisexual or inclined to be unisexual, 5-merous, solitary or in few-flowered cymes. Calyx persistent, 5-bracteolate, lobes valvate. Petals as many as calyx-lobes. Stamens 20-30. Disk annular or lining the calyx-tube. Carpels many on a small dry receptacle; style persistent or deciduous, ventral or terminal, ovule 1, pendulous. Fruit of many achenes on a dry receptacle.—Species 300.—Nearly cosmopolitan, chiefly N. temperate and arctic.

A. Stamens numerous. Flowers sometimes dioecious. Receptacle with long erect stiff hairs which entirely conceal the achenes
Leaves pinnate .... 4. *P. fruticosa.*
B. Stamens numerous. Achenes not concealed by the long hairs of the receptacle
I. Leaves interruptedly pinnate, the alternate one or more pairs smaller .... 3. *P. anserina.*
II. Leaves not interruptedly pinnate
a. Leaflets 5-7 .... 6. *P. fragarioides.*
b. Leaflets 5-11 .... 8. *P. sericea.*
III. Leaflets digitately 5-foliolate
a. Leaflets sessile, 2.5-7.5 cm. .... 1. *P. nepalensis.*
b. Leaflets 2.5-5 cm. .... 5. *P. reptans.*
IV. Leaflets digitately 3-5-foliolate .... 7. *P. kleiniana.*
V. Leaflets 3-9-foliolate .... 2. *P. supina.*

Astringent, tonic. Prescribed for foul ulcers and intestinal worms.

The following are used medicinally:—In Europe—*P. anserina* Linn., *P. fruticosa* Linn., *P. norvegica* Linn., *P. reptans* Linn., *P. tormentilla* Schrank—; in Siberia—*P. fragarioides* Linn.; in China —*P. cryptotaenia* Max., *P. discolor* Bung., *P. kleiniana* Wight and Arn.—; in Indo China—*P. chinensis* Ser., *P. cryptotaenia* Max., *P. discolor* Bung., *P. kleiniana* Wight; in North America—*P. canadensis* Linn., *P. reptans* Linn.—.

OFFICIAL:—The rhizome of *P. erecta* Hampe (Sweden), *P. silvestris* Necker (Germany, Switzerland), *P. tormentilla* DC. (France).

1. **Potentilla nepalensis** Hook. Exot. Flor. II, t. 88; Blatter Beautiful Fl. Kashmir I, 106, pl. 21, fig. 3.—PLATE 395B.

A perennial herb. Stems erect, 30-90 cm. high, hairy, from a woody rootstock. Leaves long-stalked, digitately divided. Leaflets 5, often only 3 in the upper leaves, ovate or oblong-ovate, stalkless, 2.5-7.5 by 0.6-3.2 cm. long, teeth large, blunt, or sharp, upper and lower surfaces thinly hairy. Flowers dark crimson or bright rose-coloured, veined, claw darker, 2-2.5 cm. diam., in spreading panicles at the end of the branches, stalked. Petals inversely cordate at tip, longer than the calyx. Achenes very many on a globose hairy receptacle, wrinkled.

Distribution: W. temperate Himalaya, 5,000—8,000 ft., from Murree and Kashmir to Kumaon.

The root is considered depurative.

The root is used externally in the Yunani system, the ashes being applied with oil to burns (Stewart).

Punjab: Rattanjot—.

2. **Potentilla supina** Linn. Sp. Pl. (1753) 497.—PLATE 395A.

An annual herb. Stems many from the root, 15-45 cm. high, spreading, branched, leafy, hairy, stout or slender. Leaves 1.3-7.5 cm. long, pinnate. Leaflets 3-9, oblong, 6-25 mm. long, crenate or sharply toothed, sometimes lobed, both surfaces thinly hairy. Leaf-stalk 1.3-5 cm. long. Stipules ovate, entire. Flowers 6-8 mm. diam., solitary in the axils of the leaves, stalks 4-13 mm. Calyx-lobes blunt or sharp. Petals yellow, oblong, smaller than the calyx. Achenes many, very small, smooth or ridged. Receptacle very hairy.

Distribution: N.-W. Himalaya up to 8,500 ft.—Afghanistan, N. Asia, N. Africa, Atlantic.

The roots are employed in Sind as a febrifuge (Murray).

3. **Potentilla anserina** Linn. Sp. Pl. (1753) 495.

A perennial herb, 7.5-30 cm. high. Rootstock very short, slender, branched, sending out long racemes, 30 cm. and more long. Leaves forming a spreading tuft from the crown, 5-25 cm., green above, silky beneath, pinnately divided, with stolons from the axils.

Leaflets 6-10 pairs, pairs of leaflets alternately large and small, single leaflets oblong or obovate, deeply toothed, the teeth tipped with silky hairs or divided nearly to the base, close, stalkless. Stipules enclosing the buds, hooded. Flowers large, 1.3-2.5 cm. diam., solitary, yellow on solitary slender stalks in the axils of the leaves. Flower-stalk 2.5-15 cm. long. Calyx-lobes lanceolate, long-pointed. Petals rounded. Achenes many, smooth.

Distribution: W. Himalaya up to 16,000 ft., Kashgar.—N. Asia, Orient, Europe, N. America, Australia.

The leaves and the roots are used in Europe as an astringent. The whole herb is considered astringent and tonic.

Catalan: Peu trist, Platejada—; *Dutch:* Vijjvingerkruid, Zilverschoon—; *English:* Cinguefoil, Silverweed—; *French:* Argentine, Ansérine, Herbe aux oies—; *German:* Daukruet, Feigwarzenkraut, Fieffingerkraut, Fingerkraut, Fuenffingerkraut, Gaensekraut, Gaenserich, Martinsband, Sauringel, Silberblatt—; *Italian* Argentina—; *Portuguese:* Argentina—; *Roumanian:* Scrintitoare—; *Russian:* Gusinaya lapka, Serebryanik—; *Spanish:* Plateada—.

4. **Potentilla fruticosa** Linn. Sp. Pl. (1753) 495.

A shrub about 0.9 m. high, branches rather slender, bark ultimately peeling off in fibrous strips. Leaves 5-7-foliate or towards the ends of the shoots 3-foliate; the uppermost pair with broad decurrent bases, the two lowest pairs in 7-foliate leaves springing from the same point on the rhachis; stipules pale brown, membranous. Flowers yellow, solitary or in few-flowered cymes. Bracteoles as long as but narrower than the calyx-lobes. Petals orbicular, twice as long as the calyx-lobes. Anthers oval with broad connectives. Ovaries concealed by hairs; style not narrowed upwards; stigma capitate.

Distribution: From Kashmir, 8,000—12,000 ft., to Sikkim, 12,000—16,000 ft.—N. Asia, Europe.

In the North of Europe, an infusion of the leaves is used as an astringent.

English: Shrubby Cinguefoil—; *Ladak:* Penma, Pinjung—; *Nepal:* Chinyaphal—; *Punjab:* Merino, Spangjha—.

5. **Potentilla reptans** Linn. Sp. Pl. (1753) 499.

A perennial creeping herb. Rootstock woody. Runners 30-60 cm., slender, leafy at the nodes. As it lies on the ground it is never more than 15 cm. high. Leaves digitately divided into 5 leaflets, stalked. Stalks 2.5-15 cm. long, slender. Leaflets 2.5-5 cm. long, membranous, sometimes with very short stalks, obovate, or inversely lanceolate, toothed, blunt at the tips. Stipules small, oblong, entire. Flower-stalk 2.5-10 cm. long, erect, solitary in the axils of the leaves, 1-flowered, naked. Flowers 1.3-2 cm. diam. Calyx-lobes broad or narrow, sharp-pointed. Petals obcordate, golden-yellow. Achenes many, dark brown.

Distribution: N. temperate zone of Europe, N. and W. Asia, Afghanistan, Kashmir, N. China, Japan, Abyssinia.

The herb is astringent and febrifuge. It is reputed in Annam for its astringent root.

In Europe, the root is given as an astringent in the forms of powder, infusion, or extract. The watery infusion of the herb is used for diarrhœa, looseness of bowels, etc.; externally, as an astringent lotion.

In Tuscany, the plant is used as a haemostatic.

Catalan: Cinch en rama, Peu de rata—; *English:* Cinquefoil, Fiflef, Five-finger-blossom, Five-finger-grass, Five-fingers, Five-leaf, Five-leaved-grass, Golden-blossom, Herb Five-leaf, Sink-field, Synkefoyle, Tormentil—; *French:* Herbe à cinq feuilles, Main de Mars, Nerf de boeuf, Patte de pigeon, Pied court, Pipeau, Quintefeuille—; *Italian:* Cinquefoglio, Pentafilo—; *Languedoc:* Frézié sauvage—; *Malta:* Creeping Cinquefoil, Cinquefoglio, Frauli salvagga—; *Spanish:* Cinco en rama, Potentila—.

6. **Potentilla fragarioides** Linn. Sp. Pl. (1753) 496.

A perennial herb. Stems 5-30 cm. high, robust, erect or nearly so, hairy. Leaves pinnately compound, 2.5-25 cm. long. Leaflets 5-11, often only 3 in the upper leaves, 1.3-2.5 cm. long, membranous or rather leathery, ovate, or oblong-ovate, or obovate, lateral leaflets gradually diminishing in size from the uppermost pair downwards, end-leaflet 1.3-3.8 cm. long, teeth large, blunt or sharp-pointed, upper

surface green, hairy, lower densely clothed with long pale or white hairs. Flowers yellow or white, 0.8-1.7 cm. diam., almost sessile or long-stalked, in open, terminal corymbs. Calyx hairy, lobes triangular or oblong. Petals twice as long as the calyx, rounded, obcordate or obovate. Stamens many. Achenes wrinkled or smooth, hairless; receptacle hairy.

Distribution: Temperate Himalaya, from Waziristan and Kashmir to Bhutan; Nilgiris, 7,000 ft.;—Siberia to China and Japan.

In the North of Europe, an infusion of the leaves is considered astringent.

7. **Potentilla kleiniana** Wight & Arn. Prodr. 300.

An annual herb. Stems many, slender, prostrate, leafy, 15-60 cm. high, thinly hairy. Leaves digitately divided into 3 or 5 leaflets. Leaflets 1.3-5 cm. long, ovate or narrowly oblong, teeth blunt or sharp-pointed. Flowers 6 mm. diam., yellow, forming cymes at the end of the stems. Calyx sparsely silky, lobes entire. Petals slightly longer than the calyx. Achenes very small, deeply wrinkled; forming a globose head. Receptacle hairless.

Distribution: Temperate Himalaya, from Kashmir, 3,000—7,000 ft., to Sikkim, 4,000—9,000 ft., and Bhutan, Khasia Hills, 4,000 ft., Nilgiris, 6,000—7,000 ft.

In Tongking, the fresh leaves are pounded and applied to abscesses; the roots and the stem which are considered toxic are pounded and applied to the bites of snakes and centipedes.

In China and Malaya, the entire plant is used as an astringent.

Indo China: Sa ham—.

8. **Potentilla sericea** Linn. Sp. Pl. (1753) 495.

A perennial herb, white, densely silky, very variable, getting smaller with increasing elevation from 45-7.5 cm. Rootstock very stout, perpendicular, with many heads. Leaves 2.5-15 cm. long, crowded, oblong, pinnate. Leaflets 5-11, oblong, all cut nearly to the midrib, rarely only half way, silky on both surfaces, margins bent back. Flowers yellow, 0.6-2 cm. diam., many in dense, hairy corymbs in larger plants, few- or 1- flowered in the smaller. Calyx-lobes triangular-ovate or lanceolate. Petals rounded, obovate. Achenes many, smooth.

Distribution: W. alpine Himalaya from Kashmir to Kumaon, Orient, Soongaria, N. China, N. America.

The whole plant is astringent.

AGRIMONIA Tourn. ex Linn.

Slender erect leafy perennial herbs. Leaves interruptedly pinnate; leaflets coarsely serrate; stipules partially adnate to the petiole. Flowers small, yellow, in terminal spike-like racemes, 2-bracteolate; pedicels bracteate at the base. Calyx persistent; tube turbinate, spinous; mouth contracted; lobes 5, triangular, imbricate. Petals 5. Stamens 5-10 or more, inserted at the mouth of the calyx. Disk lining the calyx-tube, its margin thickened. Carpels 2, included in the calyx-tube; styles exserted, stigma 2-lobed; ovule 1, pendulous. Fruit pendulous, of 1 or 2 achenes enclosed in the hardened spinous calyx.—Species 10.—N. temperate.

A. eupatoria Linn. is used medicinally in Indo China, Europe, North America, and South Africa.

The leaves of *A. eupatoria* Linn.=*A. officinalis* Lamk. are officinal in Portugal.

1. **Agrimonia eupatoria** Linn. Sp. Pl. (1753) 448.—PLATE 396.

A perennial, hairy herb; stems erect, 60-90 cm. Leaves pinnately compound. Lower leaves 10-18 cm.; leaflets coarsely toothed, very unequal, larger ones 5-9, ovate, 1.3-3.8 cm., intermixed with a number of much smaller ones. Upper leaves gradually smaller and with fewer leaflets. Stipules adnate to the base of the leaf-stalk. Flowers yellow, 6 mm. diam., in terminal, spike-like racemes, each flower in the axil of a small, 3-cleft bract and with 2 smaller, 3-toothed bracteoles at the top of its stalk. Calyx-tube top-shaped, grooved, bearing outside its mouth a ring of small, hooked bristles; limb 5-lobed. Petals 5, oblong. Stamens 15. Carpels 2, free, enclosed within the calyx-tube; styles thread-like, protruding; stigmas terminal, dilated; ovule solitary. Achenes 1 or 2, enclosed in the hardened, bristly calyx crowned with a ring of hooked bristles.

Distribution: Temperate Himalaya, from Murree and Kashmir to Sikkim, 7,000—10,000 ft., Khasia and Mishmi Hills.—From Persia to the Atlantic, Siberia, Java, N. America.

The root is a mild astringent, tonic, diuretic, with a high reputation among the herbalists of Europe. The decoction is useful in coughs, simple diarrhœa, and relaxed bowels. It gives tone to the system and promotes assimilation of food.

The Zulus use the finely powdered leaves as a tapeworm remedy in man and animals. The Hottentots use an infusion as a stomachic; and the Xosas and Sutos use the plant as a vermifuge.

Catalan: Cerverola, Herberola—; *Dutch:* Agrimonie—; *English:* Agrimony, Cockleburr, Sticklewort, Stickwort—; *French:* Agrimoine, Aigremoine, Eupatoire des anciens, Eupatoire des Grecs, Francormier, Francornier, Herbe de saint Guillaume, Ingremoine, Soubeirette, Thé des bois, Thé du nord—; *German:* Ackermennich, Ackerminze, Adermennich, Aderminkraut, Adlermennich, Adomere, Aldemint, Baerenklau, Beerkraut, Brustkraut, Franzkraut, Fuenfblatt, Fuenffingerkraut, Fuenmaennertee, Gatterkraut, Heil aller Schaeden, Heil aller Welt, Herzbandkraut, Leberklettė, Griechischer Leberkraut, Menig, Menigkraut, Moenkenkraut, Odermennich, Otteminde, Ottermennig, Otterminze, Petermaennchen, Steinkraut, Steinwurz, Stubkraut, Wundermennich, Wundodermennich—; *Greek:* Ipatorion—; *Indo China:* Chi hao, Long gia, Long nha thao—; *Italian:* Agrimonia, Eupatorio de Greci—; *Languedoc:* Grimoino—; *Portuguese:* Agrimonia—; *Roumanian:* Turice, Turilamure—; *Russian:* Reneinik, Reniashok—; *Spanish:* Agrimonia, Yerba de San Guillermo—; *Suto:* Mosinwana—; *Zulu:* uMakhuthula—.

Rosa Tourn. ex Linn.

Erect, sarmentose or climbing shrubs, usually prickly. Leaves pinnate; leaflets serrate; stipules adnate to the petiole. Flowers terminal, solitary or corymbose, white yellow or red, bracts rarely persistent. Calyx-tube persistent, globose ovoid or pitcher-shaped; mouth contracted; lobes leafy, imbricate in bud. Petals 5, large. Stamens many, inserted on the disk. Disk coating the calyx-tube, all but closing its mouth by its thickened margin, silky. Carpels

many, rarely few, in the bottom of the calyx-tube; styles subterminal, free or connate above, stigma thickened; ovule 1, pendulous. Achenes coriaceous or bony, enclosed in the fleshy calyx-tube.—Species 150. —N. temperate and on tropical mountains.

A. Erect. Prickles mixed with glandular bristles. Leaflets rugose. Flowers rosy or purple. Sepals more or less pinnatifid		
1. Prickles unequal, larger hooked. Sepals reflexed in flower	1.	*R. damascena.*
2. Prickles unequal, large hooked. Bristles numerous. Leaflets and calyx glandular ciliate. Flowers nodding	2.	*R. centifolia.*
3. Prickles slender, equal. Flowers erect	3.	*R. gallica.*
B. Prickles uniform. Bristles absent. Flowers purple-red, rosy or white		
4. Evergreen, glabrous. Stipules very narrow, adnate almost to the top. Flowers large on long pedicels, rarely single. Sepals reflexed	5.	*R. indica.*
5. Leaflets 5-7, large, grey, rugose, downy and pale beneath. Flowers large, white, pale or bluish, double. Sepals often pinnatifid	4.	*R. alba.*
C. Climbing. Stipules small, often deciduous. Flowers rather small, corymbose		
6. Unarmed. Leaflets 3 or 5. shining. Flowers white or yellow	6.	*R. banksiae.*
7. Stipules and bracts pectinate. Flowers double, rosy. Petioles and inflorescence with long soft hairs and no glands. Sepals broad, ovate	7.	*R. multiflora.*

The flowers are laxative when fresh, astringent when old or dried. The seeds are considered anthelmintic.

The following are used medicinally in Europe—*R. alba* Linn., *R. canina* Linn., *R. centifolia* Linn., *R. damascena* Mill., *R. gallica* Linn., *R. indica* Linn., *R. pomifera* Herrmann; in China—*R. banksiae* R. Br., *R. indica* Linn., *R. laevigata* Mich., *R. multiflora* Thunb.—; in Indo China—*R. banksiae* R. Br., *R. indica* Linn., *R. multiflora* Thunb., *R. rugosa* Thunb.—; in Malaya—*R. laevigata* Mich., *R. multiflora* Thunb.—.

Official:—The petals of *Rosa spp.* (Germany, Hungary, Japan, Sweden); *R. gallica* Linn. (Austria, Belgium, France, Great Britain, Holand, Italy, Russia, Spain, Switzerland, United States); *R. centifolia* Linn. (Switzerland).

The flowers of *R. damascena* Linn. (Great Britain, Portugal).

The oil from the flowers of *Rosa spp.* (Holland); *R. damascena* Mill. (Denmark, France, Norway, Russia, Sweden, Switzerland); *R. trigintipetala* Dieck. (Russia, Switzerland).

The buds of *R. centifolia* Linn. (France, Portugal, United States); *R. gallica* Linn. var. *plena* and var. *praenestina* Brot. (Portugal).

The fruit of *R. canina* Linn.=*R. hibernica* Smith (Portugal).

1. **Rosa damascena** Mill. Gard. Dict. ed. VIII, n. 15.—PLATE 397.

Attaining 1.5 m.; stems usually with numerous stout and hooked prickles, sometimes mixed with glandular bristles. Leaflets usually 5, sometimes 7, ovate-oblong, serrate, more or less pubescent beneath, 2.5-6.3 cm. long; stipules scarcely dilated, sometimes pectinate; petioles prickly. Flowers usually corymbose, double, red, pink or white, sometimes striped; pedicels and receptacles glandular-hispid. Sepals deciduous, reflexing during flowering-time. Fruit obovate.

Distribution: Origin unknown. Introduced to Europe from Asia Minor. Cultivated all over India.

The flower is bitter, acrid, with a good odour; cooling, laxative, aphrodisiac, antipyretic; cures leprosy, " vata ", biliousness, burning sensations; removes bad odour from the mouth, improves appetite (Ayurveda).

The flower is bitter, sweetish; tonic, laxative, expectorant, cardiotonic; good for the eyes, headache, toothache, stomatitis; benefits the lungs, the kidneys, the liver; used in heat of body, chronic fevers, inflammation, intestinal affections; excessive perspiration; astringent when dry (Yunani).

In India, rose buds are preferred for medicinal use, as they are more astringent than the expanded flowers; they are considered to be cold and dry, cephalic, cardiacal, tonic and aperient, removing bile and cold humours. Externally applied, the petals are used as an astringent. The stamens are thought to be hot, dry and astringent, and the fruit is credited with similar properties. A conserve made from equal parts of rose petals and white sugar beaten together, known as *gulkand,* is considered tonic and fattening, and is much used by women and old people.

Afghanistan: Gul, Gulab, Gulal—; *Arabic:* Dardeahmar—; *Bombay:* Gulab, Sudburg—; *Canarese:* Panniru, Tarana—; *Catalan:* Roser de Alexandria—; *English:* Bussora Rose, Damascus Rose, Damask Rose, Persian Rose—; *French:* Rose de Damas, Rosier purgatif, Rosier de Puteaux, Rosier des quatre saisons, Rosier de tous les mois—; *Hindi:* Gulab, Sudburg—; *Malayalam:* Penimirpushpam—; *Malta:* Warda tal hall, Warda tal Madonna, Warda ta Malta—; *Persian:* Gulesurkh—; *Russian:* Rosa Kazanlikskaya—; *Sanskrit:* Atimanjula, Lakshapushpa, Mahakumari, Shatadala, Shatapatri, Shatapatrika, Soumyagandha, Sumana, Sushita, Suoritta—; *Sibi:* Gulgulab—; *Spanish:* Rosal de Alejandria, Rosal de Damasco, Rosal fino de olor—; *Tamil:* Irosa—; *Telugu:* Gulabi, Panniru, Roja—; *Urdu:* Gulab—; *Uriya:* Bosoragolabo—.

2. **Rosa centifolia** Linn. Sp. Pl. (1753) 491.—PLATE 399B.

Prickles unequal, large hooked; bristles numerous. Leaflets usually 5, pubescent on both sides or only beneath. Rhachis not prickly. Flowers usually pink, very double, on long and slender pedicels, nodding, fragrant; petals inflexed; sepals persistent.

Distribution: Native of the E. Caucasus. Cultivated in India.

There are two kinds: red and white.—The white flower is acrid with flavour; cooling, laxative, aphrodisiac; cures "tridosha", biliousness, leprosy, "kapha".—The red flower has the same properties as the white; cures diseases of the blood and scorpion-sting (Ayurveda).

The root is astringent to the bowels, vulnerary; lessens inflammation.—The leaves are applied to wounds in the head, ophthalmia; good for the teeth; useful in liver complaints and piles.—The flower is sweet, sour; maturant, emollient, tonic; used in asthma (Yunani).

The petals are said to be mildly laxative. The oil or the attar of roses is employed in medicine to disguise the unpleasant odor of certain ointments, and other external applications. The petals are given in the form of a syrup as a laxative to infants.

The flower is not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Alika, Vard—; *Bengal:* Golap—; *Burma:* Hninsi, Nesepoen—; *Canarese:* Gulabi—; *Catalan:* Roser de cent fullas—;

Cochin-China: Hoa hung tao—; *English:* Cabbage Rose, Hundred-leaved Rose, Pale Rose—; *French:* Rose à distiller, Rose pale, Rosier à cent feuilles—; *German:* Bischofsrose, Centifolie, Zentifolie—; *Hindi:* Gulab, Gulabzurdi—; *Languedoc:* Gros Poumpoun—; *Malayalam:* Gulabapushpam, Paninirpushpam—; *Persian:* Gul, Gulisurkh, Varda—; *Punjab:* Gulab, Gulisurkh—; *Sanskrit:* Alikula-sankula, Atikesara, Bhadrataruni, Brihatpushpa, Devataruni, Kanta-kodya, Kharva, Kubjaka, Mahasaha, Varikantaka, Vrittapushpa—; *Spanish:* Rosal de cien hojas, Rosal romano—; *Tamil:* Irosa—; *Telugu:* Gulabi, Roja—; *Tulu:* Gulabu—.

3. **Rosa gallica** Linn. Sp. Pl. (1753) 492.—PLATE 399C.

Upright shrub, with creeping rootstock, rarely attaining 1.5 m. high; stems usually densely covered with prickles and bristles. Leaflets 3-5, leathery, broadly oval or ovate, rounded at base, usually doubly serrate with glandular teeth, rugose above, pubescent beneath, deflexed, 2.5-5 cm. long; rhachis glandular-pubescent and often prickly. Flowers on rather stout, upright, glandular-hispid and bristly pedicels, deep pink, to crimson, 5-7.5 cm. across; receptacle glandular-hispid. Fruit subglobose or turbinate, brick-red.

Distribution: Central and S. Europe, W. Asia. Grown in India.

The dried petals are slightly tonic and astringent, and useful in debility. They are seldom used internally. The infusion is used as a flavouring for other medicines or as a lotion in ophthalmia.

Danish: Rose—; *Dutch:* Roos—; *English:* Rose, French Rose, Red Rose, Red officinal Rose—; *French:* Rosier, Rosier franzais, Rosier gallique, Rose de Provins—; *German:* Essigrose, Rose—; *Greek:* Rodon—; *Italian:* Rosa, Rosa domestica—; *Polish:* Roza—; *Portuguese:* Rosa, Rosa de Alexandria, Rosa franceza dobrada—; *Russian:* Rosa frantzuskaya—; *Spanish:* Rosal castellano, Rosal de rosas rubias—; *Swedish:* Ros—.

4. **Rosa alba** Linn. Sp. Pl. (1753) 492.—PLATE 398.

Upright shrub, becoming 1.8 m. high; stems with scattered hooked prickles and sometimes with bristles. Leaflets usually 5, broadly ovate or broadly elliptic, serrate, pubescent beneath, 2.5-5 cm. long; upper stipules dilated. Flowers more or less double,

usually several, white, fragrant; pedicels glandular-hispid; receptacle usually smooth. Fruit ovate, scarlet.

Distribution: Origin unknown, probably a hybrid of *R. gallica* and *R. dumetorum.* Cultivated in India.

The flower is bitter, acrid, pungent, with a flavour; cooling, astringent to the bowels, aphrodisiac; cures "tridosha", stomatitis, leprosy, biliousness, burning sensation; purifies the blood; improves the complexion, the taste, the appetite (Ayurveda).

The flower smells sweet; enriches the blood; carminative, laxative; lessens inflammation; useful in cold and catarrh of the nose, headache, toothache, bronchitis, hiccough, diseases of the lungs, ophthalmia, rheumatism; applied to piles; the perfume is a tonic for the brain and the heart (Yunani).

The flowers are used as a cooling medicine in fevers, also in palpitation of the heart (Baden-Powell).

Arabic: Nasarin—; *Bengal:* Shvetigulab, Swetgulab—; *Bombay:* Gul—; *Canarese:* Mullusevantige—; *Catalan:* Roser blanch—; *Hindi:* Gulab—; *Persian:* Gulemashkin—; *Punjab:* Gulseoti—; *Sanskrit:* Bahupatrika, Bhringavallabha, Bhringeshtha, Charukesara, Gandhadhya, Karnika, Kumari, Ramtaruni, Saha, Sevanti, Shatapatri, Shivavallabha, Sudala, Taruni—; *Spanish:* Rosal blanco—; *Urdu:* Siwati—; *Uriya:* Seboti, Sonuti—.

5. **Rosa indica** Linn. Sp. Pl. (1753) 492.—*R. chinensis* Jacq. Obs. Bot. III, 7; Roxb. Fl. Ind. II (1832) 513.

Glabrous, evergreen; stipules very narrow, adnate nearly to the apex. Flowers large, double, half double, rarely single, white yellow pink red or purple, on long slender pedicels; calyx-segments reflexed.

Distribution: Indigenous in China but early cultivated in India.

In China, the fruits are used as an application to wounds, sprains, injuries, and foul ulcers.

Bengal: Kanta, Katgulab—; *Cantonese:* Ts'in Kam—; *Chinese:* Ch'iang Mi, Ch'ien chin, Fo Ch'ien Hsiao, Yueh Chi Hua—; *Malaya:* Chin Kam—; *Punjab:* Sadagulab—.

6. **Rosa banksiae** (R. Br. in) Ait, Hort. Kew. ed. II, III, 256.—*R. inermis* Roxb. Fl. Ind. II (1832) 516.

Climbing to 6 m., evergreen. Leaflets 3-5, sometimes 7, elliptic-ovate to oblong-lanceolate, acute or obtusish, finely serrate, shining, glabrous except at the base of midrib beneath. Flowers on slender, smooth pedicels in many-flowered umbels, white or yellow, about 2.5 cm. across, slightly fragrant.

Distribution: Indigenous in China and Japan.—Cultivated in India.

The root is bitter and astringent, and is regarded in China as a tonic and anthelmintic. The leaves are considered a good vulnerary.

Chinese: Mu Hsiang—; *Indo China:* Moc huong hoa—.

7. **Rosa multiflora** Thunb. Fl. Jap. 214.

Deciduous shrub, with vigorous, long, recurving or climbing branches. Leaflets usually 9, obovate to oblong, acute or obtuse, serrate, pubescent, 2-3.4 cm. long. Flowers in many-flowered pyramidal corymbs, usually white, 2 cm. across or more; sepals ovate, abruptly acuminate; styles glabrous. Fruit small, globular.

Distribution: Indigenous in Japan and China.—Cultivated in India.

In China and Malaya, the fruits are used as an application to wounds, sprains, injuries, and foul ulcers.

Cantonese: Ts'in Kam—; *Chinese:* Ch'iang Mi, Ch'un Chin, Ying Shih—; *Malaya:* Chin Kam—.

Cydonia Tourn. ex Mill.

Bushes with black bark. Leaves simple, quite entire; stipules ovate, oblique. Flowers large, solitary, white or pink, woolly; bracts herbaceous, toothed. Calyx-tube clavate; lobes large, spreading, toothed. Petals 5, contorted in bud, claw woolly or glabrous. Stamens 20. Ovary 5-celled; styles 5, connate and woolly below the middle; ovules many in each cell, 2-seriate, ascending or horizontal. Fruit subglobose, intruded at the base and apex, firm and fleshy, fragrant, 5-celled, cells many seeded. Seeds small, plano-convex, testa mucilaginous.—Species 5.—Europe, warm temperate Asia to Japan.

Astringent, demulcent and refrigerant.

The following are used medicinally in Europe—*C. vulgaris* Pers.—; in China—*C. japonica* Pers., *C. sinensis* Thouin. *C. vulgaris* Pers.—; in Malaya—*C. sinensis* Thouin.—; in Brazil—*C. vulgaris* Pers.—; in the Transvaal—*C. vulgaris* Pers.—.

OFFICIAL:—The fruit of *C. vulgaris* Pers. (France, Switzerland).

1. **Cydonia vulgaris** Pers. Syn. II (1807) 40.—PLATE 399A.

Large deciduous shrub, bark dark brown, young shoots tomentose. Leaves simple, 5-10 by 3.8-7.5 cm., ovate or ovate-elliptic, base rounded or slightly cordate, entire, dark green and glabrous above when mature, grey-tomentose beneath; petiole hairy, 1-1.5 cm. long; stipules 7.5 mm. long, oblong, obtuse, glandular-serrate. Flowers 5 cm. across, white or pinkish, solitary, axillary, appearing after the leaves, peduncles short. Calyx-tube clavate, tomentose; lobes 1.3 cm. long, oblong-lanceolate, glandular-serrate, reflexed, longer than the calyx-tube, tomentose. Petals 5, contorted, claws short, woolly. Stamens 20, in 1 series. Ovary 5-celled; styles 5, connate and woolly below the middle; ovules many in each cell, 2-seriate. Fruit a pome, pyriform, ribbed, depressed at the apex, aromatic, firm, fleshy, clothed with grey or woolly tomentum, 5-celled; cells cartilaginous, many-seeded; seeds covered with mucilage.

Distribution: Probably a native of Persia and Turkestan. Cultivated in N.-W. India.

The seeds are sweet, sour; tonic, antidiarrhœal, antidysenteric, aphrodisiac; cure "vata" and "tridosha" (Ayurveda).

The fruit is of three kinds; sour, sweet; tonic, astringent, diuretic, vulnerary, antipyretic, expectorant; good for the brain and the liver; improves appetite; lessens thirst, asthma; good for ulcers. —The seed is tasteless, vulnerary; used in sore throat, stomatitis, burns; lessens cough, fever, burning sensation, intestinal colic; heals ulcers (Yunani).

The sweet and sub-acid quinces are commonly eaten as a fruit by the Arabs and Persians, and are considered cephalic, cardiacal and tonic. The leaves, buds and bark of the tree are domestic remedies among the Arabs on account of their astringent properties.

In India, the seeds are considered cold, moist, and slightly astringent, and are one of the most popular remedies in native practice, the mucilage being prescribed in coughs and bowel complaints as a demulcent; externally it is applied to scalds, burns and blisters. In the Transvaal, a mucilaginous preparation made by boiling the crushed seeds is used as a dressing for bed-sores.

The seeds act as demulcent, and are used by the natives in diarrhœa, dysentery, sore-throat, and fever. The dried fruit is used as a refrigerant.

The mucilage of Quince seeds is soothing and protective to an irritated or inflamed skin. In Europe, it is given internally for soreness of the living mucous membranes of the stomach and bowels, as in gastric catarrh, and for cough with a dry sore throat. It is of use in gonorrhœa, dysentery, and diarrhœa; externally also, in eye diseases, as a soothing lotion.

The oil from the seeds, and the pectin have been studied chemically (Journ. Chem. Soc., 1899).

Arabic: Bihitursh, Safarjab—; *Canarese:* Simedalimbe—; *Catalan:* Codonyer—; *Chinese:* Ming Cha—; *Dutch:* Queepeerenboom, Qweepeerenboom—; *English:* Quince Tree—; *French:* Cognassier, Coignassier, Coignier—; *German:* Aepfelquitte, Birnenquitte, Quitte, Quittenbaum—; *Greek:* Krysomilia, Kydonia—; *Hindi:* Abi, Bihi—; *Hova:* Koaintsy, Merika—; *Italian:* Cotogno, Melocotogno—; *Kashmir:* Bamsutu, Bamtsuntu—; *Languedoc:* Coudougié, Coudounier, Coudouxinié—; *Mastung:* Bibi—; *Mexico:* Membrillero—; *Persian:* Beh—; *Polish:* Pigwa—; *Portuguese:* Marmeleiro—; *Roumanian:* Gutuiu—; *Russian:* Kvitovoi dyerevo—; *Sanskrit:* Amrutaphala—; *Spanish:* Membrillero—; *Tamil:* Simaimadalai—; *Telugu:* Simadanimma—; *Urdu:* Bihi—.

PYRUS Linn.

Trees or shrubs. Leaves deciduous, simple or pinnate; stipules deciduous. Flowers white red or pink, in terminal cymes or corymbs; bracts subulate or linear. Calyx-tube urceolate turbinate or obconic, lobes 5 erect or reflexed, persistent or deciduous. Petals 5, quincun-

cially imbricate in bud. Stamens 20 or more, filaments sometimes connate at the base. Disk annular, or coating the calyx-tube. Carpels 2-5, connate and adnate to the calyx-tube, styles 2-5, free or connate below, stigmas truncate; ovules 2 in each cell, basal, collateral, ascending. Fruit (a pome) fleshy, 2-5-celled; cells with a membranous or cartilaginous often 2-valved endocarp, 1-2-seeded. Seeds when in pairs plano-convex, testa coriaceous; cotyledons amygdaloid.—Species about 65.—Temperate and cold regions of the N. hemisphere.

1. Calyx-lobes broad-ovate, acute, persistent. Fruit globose .... 1. *P. malus.*
2. Calyx-lobes ovate or lanceolate, persistent. Fruit pyriform .. 2. *P. communis.*

The following species are used medicinally in Europe—*P. malus* Linn., *P. communis* Linn.—; in China—*P. betulaefolia* Bunge, *P. calleryana* Decne, *P. malus* Linn., *P. sinensis* Lindl., *P. spectabilis* Ait.—.

1. **Pyrus malus** Linn. Sp. Pl. (1753) 479.

Young shoots, underside of leaves and inflorescence clothed with thin white silky tomentum. Leaves ovate, acuminate, obtusely serrate, petiole usually half the length of leaf or shorter. Flowers white, tinged with red. Styles 5, connate, ovary 3-5-celled. Fruit on a short pedicel, large, globose, intruded at both ends crowned by the persistent calyx-lobes.

Distribution: Indigenous in Europe and W. Asia. Supposed to be wild in the N.-W. Himalaya.—Largely cultivated.

The fruit is acrid, sweet, cooling; fattening, aphrodisiac; useful in "vata" and biliousness; causes "kapha" and constipation (Ayurveda).

In the United States of America, an infusion of apple-tree bark is given with benefit during intermittent, remittent, and bilious fevers.

The poultice made of rotten apples is commonly used in Lincolnshire for the use of weak, or rheumatic eyes. In France, an apple poultice is employed for inflamed eyes, the apple being roasted and its pulp applied over the eyes without any intervening substance.

To obviate constipation apples taken at night, whether baked or raw, are admirably efficient.

In England, water in which apples have been boiled is prescribed as a cooling drink for feverish patients.

The juice of a sour apple, if rubbed on warts first pared away to the quick, will serve to cure them. In Germany, ripe apples are applied to warts to remove them.

Arabic: Tuffah, Tyffah—; *Bengal:* Seb—; *Canarese:* Sebu, Sevu—; *Catalan:* Pome dols—; *Chinese:* Lin Ch'in, Nai, Pim Po—; *Danish:* Abreletrae—; *Dutch:* Appleboom—; *English:* Apple Tree, Crab Apple—; *Finland:* Omena—; *French:* Pommier—; *German:* Apfelbaum—; *Greek:* Milia—; *Hindi:* Seb,, Seo, Sev—; *Hova:* Paoma, Poma—; *Hungarian:* Almafa—; *Illyria:* Jabuka—; *Italian:* Melo, Pomo—; *Kalmuk:* Alema—; *Kunawar:* Palu—; *Ladak:* Kushu—; *Malta:* Apple, Melo, Pomo, Tuffieh ta Billudja—; *North-East Aghanistan:* Seb, Shewa—; *North-West Provinces:* Sco, Seb, Seo, Sheo—; *Paugi:* Chur—; *Persian:* Seb, Sef, Sib, Sir—; *Polish:* Jablon—; *Portuguese:* Maceira—; *Punjab:* Cho, Chui, Chung, Chunt, Kashu, Khaju, Li, Palu, Senu, Sher, Sun, Tsunt—; *Pushtu:* Mana, Manra—; *Roumanian:* Mar—; *Russian:* Yablon—; *Sanskrit:* Badara, Mushtinanan, Seba, Sevam, Sinchitika—; *Sind:* Suf—; *Spanish:* Manzano, Mauzano dolce—; *Swedish:* Appeltraed—.

2. **Pyrus communis** Linn. Sp. Pl. (1753) 479.

Usually glabrous, branchlets on young trees often spinescent. Leaves broadly ovate, entire or obtusely serrate, petiole slender, nearly as long as leaf. Flowers white, styles 5, free. Fruit more or less turbinate, not intruded at base, crowned with the persistent calyx.

Distribution: Indigenous in E. and Central Europe and W. Asia.—Largely cultivated in the N.-W. Himalaya.

The fruit is sour, sweet, indigestible, aphrodisiac; useful in "vata" and "tridosha"; improves taste (Ayurveda).

Afghanistan: Amrucha, Amrud, Nak—; *Arabic:* Amrud—; *Catalan:* Perer—; *Dutch:* Peerboom—; *English:* Pear Tree, Wild Pear—; *French:* Aigrin, Poirier—; *German:* Birnbaum—; *Hindi:* Nashpati—; *Hungarian:* Koertefa—; *Italian:* Pero—;

Kashmir: Amrud, Batang, Batank, Kishtabahira, Naspati—; *Malta:* Wild Pear, Pero selvatico, Langias salvagg—; *North-West Provinces:* Nak, Naspati—; *Persian:* Nashpati—; *Portuguese:* Pereira—; *Punjab:* Batang, Batank, Charkeint, Li, Nak, Nashpati, Naspati, Sunkeint, Tang, Tangi—; *Roumanian:* Par—; *Russian:* Grusha—; *Sanskrit:* Amritaphala—; *Saora:* Sapota—; *Spanish:* Peral—; *Tamil:* Perikkay—; *Telugu:* Berikaya, Beripandu—.

ERIOBOTRYA Lindl.

Small or large trees. Leaves simple, entire or serrate, very coriaceous; stipules lanceolate or broad. Flowers in thirsoid panicles, white. Calyx-tube turbinate obconic or clavate; lobes small, erect or spreading, persistent. Petals 5, contorted or imbricate in bud, obovate or orbicular, usually oblique and notched, margins sinuate, claw glabrous or woolly. Ovary 2-5-celled; styles 5, connate and woolly below; ovules 2 in each cell, basal, ascending, placenta sometimes cupuliform. Fruit a succulent or dry rarely 1-2-celled berry; endocarp membranous, 1- rarely 2-3- seeded. Seeds large, ovoid and cylindric or flattened on one side, testa hard coriaceous and mucilaginous; cotyledons very thick.—Species 12.—Warm Asia.

E. japonica Lindl. is used medicinally in China and Indo China.

1. **Eriobotrya japonica** Lindl. in Trans. Linn. Soc. XIII (1822) 102.—PLATE 400.

A small evergreen tree, branches, leaves beneath and inflorescence densely softly woolly. Leaves 15-20 by 3.8-7.5 cm., narrowly oblanceolate, acuminate, remotely serrate, thick, coriaceous, nerves 12-15 pairs, prominent beneath, base narrowed into a very short stout woolly petiole; stipules 1.3 cm. long, lanceolate, acuminate, subpersistent. Flowers 1.3 cm. across, white, fragrant, in terminal panicles 7.5-15 cm. long. Ovary 2-5-celled; styles 5, connate and woolly below; ovules 2 in each cell. Fruit succulent, formed from the calyx-tube, 2.5-3.8 cm. long, pyriform, yellow, endocarp very thin, seeds 2-5, large, angular.

Distribution: A native of China and Japan. Largely cultivated in N. India.

The fruit is sour when unripe, sweet when ripe, sedative, antipyretic, used in vomiting, waterbrash, thirst (Yunani).

The leaves taken in infusion produce a good effect in diarrhœa. The tincture is employed in indigestion.

The leaves are considered astringent in Indo China; they are used in diarrhœa and drunkenness.

In China, the flowers are sometimes used as an expectorant in cough, asthma, apoplexy, and phthisis.

The fat from the seeds has been examined chemically (*Journ. Chem. Ind.*, 1911).

Canarese: Lakote—; *Chinese:* P'i Pa—; *English:* Chinese Medlar, Japan Medlar, Japan Quince, Loquat—; *French:* Bibacier, Bibas, Bibassier, Néflier du Japon—; *Hindi:* Logat—; *Hova:* Bibasy—; *Indo China:* Lo quat, Nhot nhat ban, Son tra nhat ban, Ti ba, Ti ba diep, Ton bap—; *Italian:* Nestole di Giappone—; *La Reunion:* Bibassier—; *Malta:* Japanese Medlar, Loquat, Nespolo del Giappone, Nespli—; *Tamil:* Ilakotta, Nokkotta—; *Urdu:* Lakhota—.

Cotoneaster Linn.

Shrubs or small trees. Leaves quite entire, coriaceous, usually very downy beneath; stipules setaceous, deciduous. Flowers small, solitary or in axillary or terminal cymes, white or pink, sometimes polygamous. Calyx-tube turbinate or campanulate; lobes 5, short, persistent. Petals 5, imbricate in bud. Stamens 20, inserted at the mouth of the calyx. Carpels 2-5, adnate wholly or by their backs only to the calyx-tube; styles 2-5, free, stigma truncate; ovules 2 in each cell, erect, basal, geminate, raphe lateral. Fruit small, ovoid globose or turbinate, with 2-5 bony 1-seeded stones.—Species 50.—N. temperate.

A. Leaves deciduous. Subpersistent in *nummularia.* Margins not recurved
   1. Leaves 0.8-5 cm. Cymes few-flowered or flowers solitary ... 1. *C. nummularia.*
   2. Leaves 2.5-10 cm. Cymes usually branched and many-flowered .... 2. *C. bacillaris.*
B. Leaves persistent, rigid, 8 mm. long. Margins recurved .... 3. *C. microphylla.*

C. bacillaris, Wall. & *C. microphylla* Wall. var. *buxifolia* Parker are used medicinally in Indo China.

1. **Cotoneaster nummularia** Fisch. & Mey. Ind. Sem. Hort. Petrop. II, 34.

A straggling or prostrate bush with woody often divaricate branches. Leaves 8-38 mm., sometimes only 6 mm. long, orbicular or obovate, obtuse or retuse or apiculate, nerve ovate; white or densely silkily woolly beneath. Cymes woolly, very short, 2-5-flowered. Flowers small, crowded, calyx usually tomentose but sometimes glabrate. Fruit small, obovoid, globose, black, erect.

Distribution: W. Tibet and Kashmir, 6,000—11,000 ft., Soongaria.—Afghanistan and westwards to Asia Minor.

The plant is used as an aperient, expectorant, and stomachic.

Persian: Siahchob—.

2. **Cotoneaster bacillaris** Wall. in Lindl. Bot. Reg. (1829) ad t. 1229.

An erect deciduous shrub or small tree, young shoots tomentose or nearly glabrous, reddish brown. Leaves variable, 3.8-7.5 cm. long, lanceolate, ovate or obovate, quite glabrous or more or less wooly-tomentose beneath, usually distinctly narrowed into the petiole, tip acute or rounded, dark green above, pale green beneath; petiole up to 13 mm. long. Cymes usually branched and many-flowered, 2.5-5 cm. across. Calyx -tube and -lobes puberulous to woolly. Petals white. Stamens 20. Styles 2. Fruit bluish black with a glaucous bloom.

Distribution: Temperate Himalaya, 4,000—8,000 ft., Murree, Kashmir to Nepal, Salt Range.

The stolons are considered astringent in Indo China.

Garhwal: Ruins—; *Indo China:* Sa luan duong—; *Jaunsar:* Leonsh, Raunsh, Ruinsh—; *Kangra:* Rauns—; *Naini Tal:* Ruins—; *Punjab Hills:* Khariz, Kherba, Kherbaba, Lehan, Lin, Linu, Luni, Rau, Reus, Reush, Ri, Rish, Riu, Sichu—; *Pushtu:* Kharwe—; *Salt Range:* Jalidar, Sichu—.

3. **Cotoneaster microphylla** Wall. in Lindl. Bot. Reg. (1827) t. 1113.

A low or prostrate rigid much-branched evergreen shrub, young twigs sparsely hairy becoming glabrous and purplish brown. Leaves very variable in size, usually 8 mm. long, oblong, obovate or elliptic, coriaceous, shining above nearly glabrous except on the depressed midrib, pale and more or less bristly-hairy beneath, margins recurved, ciliate, apex rounded, retuse or apiculate, base cuneate or rounded; petiole 2.5 mm. long, or less. Flowers white, 7.5 mm. across, 1-3 together, usually solitary. Calyx-tube and lobes densely hairy. Stamens 20. Styles 2. Fruit scarlet.

Var. *buxifolia* Parker Forest Fl. Punjab 228.—*Cotoneaster buxifolia* Wall. Cat. 661 partim.

Leaves larger up to 17 by 13 mm. Flowers larger, 13 mm. across, usually 2-3 together; fruit 7 mm. across.

Distribution: Chamba and Bashahr States, 4,000—9,000 ft.

The stolons are used as an astringent in Indo China.

Indo China: Sa luan duong—.

SAXIFRAGACEAE.

Trees, shrubs, or herbs of various habit. Leaves alternate and exstipulate or with stipules adnate to the base of the petiole, or opposite and exstipulate. Flowers usually hermaphrodite; sepals, petals, and stamens symmetrically regular. Calyx usually 5-merous, more or less adnate to the ovary; lobes imbricate or valvate. Petals 5 or 4 (rarely 0), usually perigynous, often small, imbricate or valvate. Stamens inserted with the petals, equalling or double their number, rarely indefinite. Ovary of 2 or 3-5 united carpels, usually 2- or 3-5 -celled with axile placentas, occasionally 1-celled with parietal placentas; ovules numerous, anatropous, erect or pendulous; styles as many as the carpels, free or more or less connate; stigma

capitate, or lateral and subcapitate. Fruit capsular or baccate. Seeds usually numerous, usually albuminous.—Genera 90.—Species 750.—Cosmopolitan, chiefly temperate.

A. Herbs. Ovary 2-celled
Leaves simple .... BERGENIA.
B. Shrubs or trees. Leaves opposite, exstipulate, simple. Stamens double the number of petals or more numerous
Petals expanding. Berry blue .... DICHROA.
C. Shrubs. Leaves alternate, simple. Seeds immersed in pulp
Flowers racemose or subsolitary .... RIBES.

Medicinally the Order is of little importance. A few of the members are slightly astringent.

OFFICIAL:—*Ribes rubrum* Linn. in France.

BERGENIA Moench.

(Under SAXIFRAGA in Bentham & Hooker).

Rootstock stout. Leaves simple, undivided, with a large sheath at the base of the petiole. Scape corymbose, 15-45 cm. high. Petals white or red. Calyx-lobes erect in fruit. Seeds much larger than in Saxifraga, roundish or elongate, subpyramidal. Smooth.—Species 10.—E. Asia.

B. ligulata (Wall.) Engler is used medicinally in Indo China.

1. **Bergenia ligulata** (Wall.) Engl. in Bot. Zeitg. XXVI (1868) 840; Blatter Beautiful Fl. Kashmir 1, 125, pl. 23, fig. 7.—*Saxifraga ligulata* Wall. in As. Res. XIII (1820) 398.—PLATE 401 (under *Saxifraga ligulata* Wall.).

A perennial herb. Rootstock very stout. Stems short, thick, fleshy, procumbent. Leaves ovate or round, 5-15 cm. long at the time of flowering, in the autumn attaining 30 cm. or more and turning bright red, cordate, entire, fringed with short stiff hairs, both surfaces hairy, becoming almost hairless in age. Stalk sheathing at the base. Flowers white, pink or purple, 3.2 cm. diam., forming a cymose panicle. Flowering stem flexible, leafless, 10-25 cm. long. Styles long.

Distribution: Temperate Himalaya, from Kashmir to Bhutan, Khasia Hills, 4,000 ft.

The root is bitter and acrid; cooling, laxative, analgesic; useful in "tridosha", piles, tumours, strangury, vesicular calculi, urinary discharges, heart diseases, splenic enlargement, ulcers, diseases of the bladder, dysentery, diseases of the lungs (Ayurveda).

The root is bitter; astringent, alexiteric, diuretic, styptic, abortifacient, tonic, aphrodisiac; removes mucous from the intestines; useful in hydrophobia, splenic enlargement, menorrhagia, excessive uterine hæmorrhage, biliousness, eyesores; used in diseases of the liver (Yunani).

The root is used as a tonic in fevers, diarrhœa and cough, and also as an antiscorbutic. It is bruised and applied to boils and also in ophthalmia. It is also considered absorbent and given in dysentery.

In Sind, the root is rubbed down and given with honey to children when teething.

In Indo China, the leaves are ground in a mortar, and the juice used for earache.

Arabic: Jantiane—; *Bengal:* Himasagara, Pathakucha, Patharchuri—; *Bombay:* Pashanbheda—; *Canarese:* Alelgaya, Pashanabhedi—; *Gujarat:* Pakhanabheda—; *Hindi:* Pakhanabheda—; *Indo China:* Ho nhi thao—; *Marathi:* Pashanbheda—; *Persian:* Kushad—; *Punjab:* Banpatrak, Batpia, Dakachru, Dharposh, Kachalu, Kurgotar, Phota, Phuta, Popal, Saproti, Shaprochi, Til, Wa—; *Pushtu:* Kamarghwal—; *Sanskrit:* Ashmabhedaka, Ashmaghna, Bhimayojini, Giribhita, Nagabhita, Pashanabheda, Pashanabhedana, Shailagarbhaja, Shilabheda, Shveta, Upalabheda—; *Telugu:* Telanurupindi—; *Urdu:* Kachalu, Pakhanabeda—.

DICHROA Lour.

A shrub. Leaves opposite, serrate, lanceolate, persistent. Panicle terminal. Calyx-tube adnate to the ovary; Limb 5-6-toothed. Petals 5 or 6, thickish, valvate, blue or purplish. Stamens 10 or 12, epigynous. Ovary ¾-inferior, 1-celled; styles 3-5; ovules numerous, on 3-5 parietal placentas formed by the inflexed margins of the carples. Berry ¾-inferior, blue. Seeds numerous, small, obovoid; testa with large reticulations.—Species 4.—China, Indo-Malayan.

D. febrifuga Lour. is used medicinally in Malaya, Indo China, and China.

1. **Dichroa febrifuga** Lour. Fl. Cochinch. 301.—*Adamia cyanea* Wall. Cat. 441; Bot. Mag. t. 3046.—PLATE 402.

A shrub, often forming undergrowth in forests, young shoots and inflorescence pubescent with short hairs. Leaves opposite, lanceolate, blade 10-20 cm., tapering into petiole 1.3-2.5 cm. Flowers pale blue, sometimes violet, in terminal cymose panicles, petals 5 or 6, thick, valvate. Ovary ¾-inferior, ovules indefinite on 3-5 parietal placentas. Berries bright dark blue.

Distribution: Himalaya, Nepal to Bhutan, 4,000—8,000 ft., Khasia and Shan Hills, Upper Burma, Malay Peninsula.—Malay Archipelago, China.

The shoots and the bark of the roots are made into a decoction and used as a febrifuge by the Nepalese.

In Malaya, Indo China, and China, the stem and leaves are considered an excellent remedy for all kinds of fevers, and the root is given as a tonic.

Bhutia: Singnamuk—; *Cochin-China:* Cay theong son, Cham chan—; *Hindi:* Basak—; *Indo China:* Ngam son, Phuek mon, Thuong son, Vang then—; *Lepcha:* Gebokanak, Gyebukanak—; *Malaya:* Chang san, Seong san—; *Nepal:* Aseru, Bansuk, Basak—.

RIBES Linn.

Prickly or unarmed shrubs. Flowers often unisexual. Pedicels bracteate at the base and 2-bracteolate at the middle. Calyx adnate to the ovary with 4-5 epigynous lobes, or the calyx-tube produced above the ovary. Petals 4-5, small, epigynous, white yellow red or purple-black. Stamens 4-5, epigynous. Ovary inferior, 1-celled; styles 2, free or connate, stigmas simple; ovules numerous, on 2 parietal placentas. Berry oblong or globose, crowned with the calyx, several-seeded.—Species 60.—N. temperate and Andine.

1. Calyx-tube hardly produced above the fruit .... 1. *R. orientale.*
2. Calyx-tube produced above the fruit .... 2. *R. nigrum.*

The fruit is a mild astringent.

The following are used medicinally in Europe—*R. grossularia* Linn., *R. nigrum* Linn., *R. rubrum* Linn.—; in Siberia—*R. grossularia* Linn.

Traces of free hydrocyanic acid have been found in the young shoots of certain species—*R. aureum, R. nigrum, R. rubrum.*

The fruit of *R. rubrum* Linn. is officinal in France.

1. **Ribes orientale** Desf. Hist. Arb. II (1809) 88.—PLATE 403.

A small shrub, unarmed, pubescent with short hairs, and viscid all over with numerous, yellow or brown stipitate glands. Leaves generally fasciculate; branchlets marked with the scars of bud-scales and leaves. Leaves nearly orbicular, with cordate or rounded base, 3- rarely 5- lobed, crenate-dentate, greyish brown beneath; basal nerves 3 or 5, with few lateral nerves. Flowers unisexual, diœcious, in erect racemes, with linear or oblong, concave, ciliate, deciduous bracts, somewhat longer than pedicels. Male racemes with many, female with few flowers. Calyx flat, cup-shaped; segments ovate, obtuse, much longer than the small obovate petals. Filaments short, not exceeding anthers. Berry red or yellow when ripe, with scattered glandular hairs, 6 mm. long or less, with about 10 seeds.

Distribution: Arid tracts of Inner Himalaya, between 6,500 and 14,000 ft., from the Indus to Nepal. Tibet, Afghanistan, Persia, Kurdistan, Caucasus, Armenia, Syria, Asia Minor, Greece.

The berries, taken one or two at a time, are considered an excellent purgative (Aitchinson).

Bhotia: Darbag—; *Ladak:* Askuta, Askutar—; *North-Western Provinces:* Gwaldakh, Kaghak—; *Punjab:* Nangke, Nyaiphulanch—; *Spiti:* Yange—.

2. **Ribes nigrum** L. Sp. Pl. (1753) 201.

Unarmed; aromatic; with round yellow glands on calyx and underside of leaves. Flowers bisexual, racemes few-flowered, pubescent, a tuft of leaves at the base, bracts minute, much shorter than pedicel, lower pedicels longer than upper; calyx tubular or campanulate beyond ovary. Berries black, 8 mm. diam., very aromatic.

Distribution: Kunawer and dry inner valleys of Kashmir.

The fruit is cooling, laxative, and anodyne.

In England, a jelly prepared from the fruit has long been employed for sore throat and quinsy. A decoction of the leaf or of the bark is commonly used as a gargle.

The fruit and the leaf are considered diuretic and diaphoretic in Spain, France, and Italy.

The leaf is used in Germany as a diuretic, refrigerant, and detergent.

The fresh leaves when applied to a gouty part will assuage pain and inflammation. The leaves and the fruits are often combined by English herbalists with the seeds of the wild carrot for stimulating the kidneys in passive dropsy.

Catalan: Riber negre—; *English:* Black Currant, Quinsyberry, Squinancy—; *French:* Cassier des Poitevins, Cassis, Groseillier noir, Groseillier noir de Pensilvanie, Poivrier—; *German:* Ahlbeere, Gichtbeere, Kassbette, Pfefferbeere, Schwarze, Johannesbeere, Wanzenkraut, Zeitbeere, Zeltbeere—; *Italian:* Ribes nero—; *Kent:* Gazles—; *Kumaon:* Paper—; *Lahoul:* Askuta—; *Punjab:* Beli, Hadar, Kadash, Mandri, Muradh, Nabar, Niangna, Shaktekas—; *Roumanian:* Coacaza neagra, Pomusoara neagra, Strugurei—; *Russia:* Chornaya smarodina—; *Spanish:* Grosellero negro—; *Sussex:* Gazles—.

CRASSULACEAE.

Herbs or undershrubs usually with fleshy or succulent stems and branches. Leaves alternate or opposite, simple or less commonly pinnately divided; stipules 0. Flowers usually cymose (paniculate in *Kalanchoe pinnata*), hermaphrodite or very rarely unisexual, regular. Calyx free, usually 4-5-fid or 4-5-partite. Petals as many as the sepals and alternate with them, free or more or less connate. Stamens adnate to the monopetalous corolla, or inserted alternately

with the petals, sometimes double their number. Carpels usually as many as the petals and opposite to them, free or connate below, narrowed upwards into the styles, with a hypogynous gland or scale at the base of each; ovules numerous, 2-seriate along the ventral suture, horizontal or pendulous, anatropous. Follicles membranous or coriaceous, 1 celled, many or few-seeded, dehiscing down the ventral suture. Seeds albuminous, usually minute; embryo terete; cotyledons short.—Genera 25. Species 450.—Cosmopolitan, chiefly S. African.

A. Petals connate, at least at the base
    Calyx 4-partite .... KALANCHOE.
B. Petals free
    Carpels 5-4, rarely 3, free or slightly connate .... SEDUM.

In general the members of this Order are vulnerary, refrigerant, sedative, antiscorbutic, and diuretic.

A toxic acrid juice is contained in species of SEDUM. Many crassulaceous plants yield malic acid.

OFFICIAL:—*Cotyledon Umbilicus* Linn.=*Umbilicus pendulinus* De Cand. in Portugal.

Sempervivum arboreum Linn. (*S. africanum* Mill) and *S. tectorum* Linn. in Portugal.

KALANCHOE Adams.

Erect stout perennial herbs. Leaves opposite, or the upper alternate, fleshy, sessile or petiolate, entire, crenate or pinnatifid. Flowers large, in many-flowered paniculate cymes, yellow, white, or purplish. Calyx 4-partite or 4-fid ½-way down, the segments shorter than the corolla-tube. Corolla with a flask-shaped tube and spreading 4-fid limb, persistent. Stamens 8, in 2 series, adnate to the corolla-tube. Hypogynous scales 4. Carpels 4, adnate to the base of the corolla-tube, attenuated into long subulate styles; ovules many. Follicles membranous. Seeds numerous, oblong-ellipsoid, with 8-15 longitudinal ribs.—Species 70.—Tropics.

A. Calyx with a long inflated tube .... 1. *K. pinnata.*
B. Calyx divided nearly to the base
    1. Leaves spathulate-oblong, crenate .... 2. *K. spathulata.*
    2. Leaves pinnatifid-laciniate .... 3. *K. laciniata.*

The following species are used medicinally in Indo China and the Philippine Islands—*K. laciniata* DC., *K. pinnata* Pers.—; in Brazil—*K. brasiliensis* Camb.—; in La Reunion—*K. pinnata* Pers—; in the Gold Coast—*K. crenata* Haw., *K. pinnata* Pers.—; in South Africa—*K. paniculata* Harv., *K. thyrsiflora* Harv.—.

1. **Kalanchoe pinnata** Pers. Syn. Pl. I (1805) 446.—*Bryophyllum calycinum* Salisb. Parad. Lond. (1805) t. 3; in DC. Prodr. III (1828) 396.—*B. pinnatum* Kurz Journ. As. Soc. Beng. XV (1871) 52.—Plate 404 (under *Bryophyllum calycinum* Salisb.).

A succulent glabrous herb 0.3-1.2 m. high; stems obtusely 4-angled, the older light coloured, the younger reddish speckled with white. Leaves variable, decussate, the lower usually simple or occasionally compound, the upper usually 3-5- or sometimes 7-foliolate, long-petioled, the petioles united by a ridge round the stem. Leaflets ovate or elliptic, crenate or serrate. Flowers pendent, in large spreading panicles with opposite stout branches; pedicels slender. Calyx 2.5-3.8 cm. long, striated red and green at the base, pale green above; teeth triangular. Corolla swollen and octagonal at the base, constricted in the middle, reddish purple; lobes triangular. Filaments green at the base, pinkish below the anthers. Anthers hastate, black. Hypogynous scales subquadrate, free or slightly adherent to the carpels. Styles green. Fruit enclosed in the persistent papery calyx and corolla. Seeds small, oblong-ellipsoid, smooth, scarcely striate. The leaves often produce, on their crenatures at the extremities of the lateral nerves, buds furnished with root, stem, and leaves, which drop off and at once become new plants.

Distribution: Believed to be a native of tropical Africa, naturalized throughout the tropics of the world.

The leaves are bitter and poisonous to insects (Ayurvedic).

The bark is bitter and poisonous; tonic, alexipharmic, astringent to the bowels, analgesic, carminative; useful in diarrhœa and vomiting, inflammations; snakes and scorpions avoid this plant, hence its use in snake-bite and scorpion-sting (Yunani).

The leaves slightly toasted are used as an application to wounds, bruises, boils, and bites of venomous insects. In the Konkan the

juice of the leaves is administered in 1/4 to 1/2 tola doses, with double the quantity of ghi in dysentery.

Decidedly beneficial effects follow their application to contused wounds and swellings; discolorations are prevented, and union of the cut parts takes place much more rapidly than it does with the ordinary treatment by water dressing.

Used in the form of poultice and powder for sloughing ulcers, it is a disinfectant.

Among the Mundas of Chota Nagpur the leaves are gathered into a ball, are baked, after which their juice is expressed. This is drunk against coughs, either alone or mixed with ghee and garlic.

In La Reunion, the plant is considered mucilaginous and emollient, and is mostly used to prepare emollient baths.

The leaves are used in the Gold Coast to cure sore eyes. They are sometimes treated until soft and then applied to swellings which have first been treated with palm oil.

In Indo China, the pounded leaves are applied to burns and scalds, and also to corns.

The plant is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kushnulhayat—; *Ashanti:* Egoror, Tamiawu—; *Bengal:* Koppata—; *Bombay:* Ahiravana, Ghayamari, Mahiravana—; *Burma:* Yoekiyapinba—; *Canarese:* Lonnahadakanagida—; *Cutch:* Ahiravana, Ghayamari, Mahiravana—; *Deccan:* Zakhmhaiyat—; *Ewe:* Flaatoga—; *Fnti:* Airporo—; *Hindi:* Zakhmhaiyat—; *Indo China:* Poun po, Poun tay, Thuoc binh, Thuoc bong—; *Krobo:* Kokonadu—; *La Reunion:* Chou de faffe, Gros pourpier clochette, Patte de poule, Patte de poule tortue—; *Malayalam:* Elamarunga, Elamarunna, Murikuti—; *Mundari:* Jiwan, Sajiwan—; *Persian:* Chubehayat, Lakhmhaiyat—; *Sanskrit:* Asthibhaksha, Parnabija—; *Tamil:* Malaikalli, Runakalli—; *Telugu:* Simajamudu—; *Twi:* Bosompra egoror, Egoror, Tamiawu—; *Urdu:* Chubehayat—.

2. **Kalanchoe spathulata** DC. Succ. Pl. & Grasses t. 65. —Plate 405.

Stem 0.3-1.2 m. high, glabrous. Leaves spathulate-oblong, obtuse, crenate, cuneate at the base, glabrous; the lower petiolate, usually 7.5-12.5 by 3.8-5 cm. (sometimes reaching 25 by 10 cm.); the upper distant, becoming very narrow, 7.5-10 by 1.3 cm. (sometimes 3-foliolate), frequently sessile. Flowers in dense many-flowered cymose panicles; lower bracts leaf-like. Calyx 6-10 mm. long, glabrous, divided almost to the very base; segments oblong-lanceolate or triangular from a broad base, acute or acuminate, 3 mm. broad at the base. Corolla clear yellow; tube glabrous, 1.3 cm. long; lobes broadly lanceolate, acute or shortly acuminate. Hypogynous scales narrow-linear, 3 mm. long, often bifid. Follicles glabrous.

Distribution: Tropical Himalaya, Burma.—China, Java.

It is poisonous to goats, and the leaves are, at Lahore, reckoned a specific for cholera. In Kangra, they are burned and applied to abscesses (Stewart).

Hindi: Haiza, Rungru, Tatara—; *Kumaon:* Bakalpatta, Patkuari—; *Nepal:* Hathokane—; *Punjab:* Haiza, Rungru, Tatara—; *Visayan:* Caritana—.

3. **Kalanchoe laciniata** DC. Succ. Pl. & Grasses t. 100; Wight Ic. t. 1158.—PLATE 406.

A large succulent herb, glabrous or more or less pubescent, 0.9-1.2 m. high; stems stout, slightly branched. Leaves numerous, large and very succulent, 7.5-10 cm. long, very variable; the lowest deeply gashed, the segments usually narrow-oblong, acute, dentate, serrate or crenate; the middle-stem leaves more or less deeply pinnatifid; the uppermost entire or nearly so, all shining, pale glaucous-green; petioles 2.5-3.8 cm. long, flattened, fleshy, amplexicaul. Flowers in paniculate cymes; bracts linear. Calyx 3-5 mm. long, glabrous or glandular-pubescent, divided to the base; segments narrowly lanceolate, acute, somewhat spreading. Corolla yellow, 1.6 cm. long; tube 1.3 cm. long; lobes lanceolate, acute or acuminate, glabrous or pubescent. Hypogynous scales 3-4 mm. long, linear. Follicles 8 mm. long, glabrous.

Distribution: Bengal, Burma, Deccan, S. M. Country, Ceylon, Malacca.—Yunnan, Java, tropical Africa.

The succulent leaves are valued as an application to wounds and sores; they allay irritation and promote cicatrization. In the Konkan, the juice of the leaves is given in bilious diarrhœa and lithiasis.

I can myself speak of their good effects in cleaning ulcers and allaying inflammation (Ainslie).

The juice is used externally in bruises and burns, also to cure superficial ulcers. As a styptic it is used on fresh cuts and abrasions.

In Indo China, the pounded leaves are applied in indolent ulcers.

Bengal: Hamsagar—; *Bombay:* Parnabij, Zakhmhyat—; *Hindi:* Hamsagar—; *Indo China:* Nien to, Truong sinh rach la—; *La Reunion:* Joubarbe—; *Philippines:* Siemprevica—; *Sanskrit:* Hemasagara—; *Tagalog:* Catacataca—; *Tamil:* Malakalli—.

SEDUM Linn.

Succulent herbs. Leaves alternate or rosulate, rarely opposite; entire or laciniate. Flowers cymose, hermaphrodite, or unisexual by abortion. Calyx 4-5-partite. Petals 5-4, free. Stamens 10-8, the alternate ones adnate to the petals. Hypogynous scales quadrate or cuneate, entire or emarginate. Carpels 5-4, free or slightly united at base, narrowed into the styles; ovules very numerous. Follicles 5-4, many-seeded.—Species 150.—N. temperate regions.

1. Leaves linear, distantly toothed .... 1. *S. asiaticum.*
2. Leaves nearly sessile, cylindric, acute .... 2. *S. multicaule.*

The genus exhibits astringent and vulnerary properties.

The following species are used medicinally in Europe—*S. acre* Linn., *S. album* Linn., *S. maximum* Suter., *S. roseum* Scop., *S. telephium* Linn.—; in China—*S. alboroseum* Bak., *S. multicaule* Wall.—; in Indo China—*S. lineare* Thunb—.

A toxic acrid juice has been found in *S. acre, S. album, S. roseum.*

1. **Sedum asiaticum** DC. Prodr. III, 401.

A perennial herb, hairless, or the branches of the cyme minutely hairy. Rootstock woody. Stems 15-30 cm. high. Leaves 2.5-3.8 cm. long, linear, distantly toothed. Cymes dense. Flowers yellow. Sepals half as long as the petals. Petals lanceolate-spathulate.

Follicles narrow, oblong-lanceolate. Style nearly straight, not recurved. Seeds ellipsoid, compressed.

Distribution: Alpine Himalaya, from Kashmir to Sikkim, 11,000—16,000 ft.

The plant is emollient, resolvent, and vulnerary.

2. **Sedum multicaule** Wall. Cat. 7232.—*S. japonicum* Sieb Herb. in Miq. Ann. Mus. Bot. Lugd.—Bat. II, 156.

Glabrous; stems usually several, nearly erect, 10-20 cm., branched. Leaves nearly sessile, cylindric, 1.3-2.5 cm., acute; both radical and stem-leaves usually numerous. Flowers yellow, 6 mm. long in bud; cyme-branches long, racemose, leafy.

Distribution: Temperate Himalaya, 4,000—7,000 ft.—China, Japan.

The plant is used in China as an emollient and vulnerary.
Chinese: Fu Chia Ts'ao—.

DROSERACEAE.

Perennial, glandular-hairy herbs. Leaves radical or alternate, usually circinate in vernation; stipules 0, represented by hairs edging the dilated base of the petiole, or scarious. Inflorescence various; flowers hermaphrodite, regular. Calyx 4-8-partite, or sepals free, imbricate, persistent. Petals 4-8, hypogynous or nearly so, imbricate in bud, marcescent. Stamens as many as the petals, hypogynous or nearly so. Ovary nearly free, globose or ovoid, 1-3-celled; ovules numerous, on 5-3 parietal placentas; styles 5-3, capitate, fimbriate or bifid. Capsule membranous, 5-3-valved. Seeds numerous, with fleshy albumen; embryo cylindric or minute.—Genera 5.—Species 100.—Throughout the world, except the Pacific Islands, in temperate and tropical regions.

As a rule they are acrid, bitter, and astringent.

A toxic acrid juice is contained in species of DIONACEA, NEPENTHES, PINGUICULA, SARRACENA.

racemes. Calyx 5-parted; segments glandular, minutely toothed. Petals 5, entire. Stamens 5. Ovary free, ovoid, 1-celled; styles 3; stigmas terminal, minutely fringed; ovules numerous. Capsule enclosed within the persistent calyx and corolla, 3-valved; seeds minute, attached to the valves.

Distribution: Hilly regions throughout India.—Malay Archipelago to Australia.

The leaves, bruised and mixed with salt, are used as a blister in Kumaon. The same practice, without the use of salt obtains in Kanawar.

Hindi: Mukhajali—; *Indo China:* Mao cao thai, Mo coi, Nha thao, Thach long nha thao—; *Punjab:* Chitra—.

2. **Drosera indica** Linn. Sp. Pl. (1753) 282.

Stem weak, suberect or decumbent, slightly branched, glandular-pubescent. Leaves cauline, alternate, 2.5-6.3 cm. long, narrow-linear 0.7 mm. broad, circinate, in vernation, the upper portion copiously fringed with very fine gland-tipped tentacles, the lower half (petiole) glabrous. Flowers in leaf-opposed racemes, 7.5-20 cm. long; pedicels 6-13 mm. long, glandular-hairy. Calyx 5 mm. long; segments oblong-lanceolate, subacute, more or less glandular-pubescent. Petals white, narrowly spathulate, slightly longer than the calyx. Capsules 3-valved; styles 3. Seeds minute, obovoid, strongly ridged and with raised reticulation.

Distribution: W. Peninsula of India, Burma, Ceylon.—Malay Archipelago, China, tropical Australia, Africa.

In Indo China, a maceration of the plant is applied topically to corns.

Indo China: Chuong giep mao cao thai, Co troi ga, Mo coi—; *Sinhalese:* Kandulessa—.

3. **Drosera burmanni** Vahl Symb. III (1794) 50.

Stem scarcely any. Leaves 6-16 mm. long, all radical, forming a close rosette on the ground, spathulate-cuneate, upper surface clothed with numerous gland-tipped tentacles longest at the margin; petioles flat; stipules nearly as long as the petioles, scarious, cut into long slender segments. Scapes 1-3, erect, glabrous, 5-20 cm. long,

from the axils of inner leaves. Flowers about 8-20, in secund racemes occupying the upper fourth of the scape only; pedicels 3-6 mm. long, slender, glabrous. Calyx 4-5 mm. long, papillose; segments linear-oblong, obtuse. Petals white, slightly longer than the calyx, spathulate. Styles 5, undivided. Capsules 5-valved. Seeds numerous, minute, black, reticulate.

Distribution: Throughout India, Ceylon.—China, Japan, Malaya, W. Africa, Australia.

The plant is powerfully rubefacient. This property is due to the presence of naphthoquinone (Brissemoret).

Chinese: Chim Ti Lo—; *Indo China:* Co troi ga—; *Malaya:* Kam tee leh—; *Sinhalese:* Wataessa—.

HAMAMELIDACEAE.

Trees or shrubs, often with stellate indumentum. Leaves alternate, rarely opposite, deciduous or evergreen, simple, teeth sometimes glandular; stipules mostly paired, often persistent, sometimes large. Flowers small, sometimes precocious, hermaphrodite or male or female, often capitate, actinomorphic or zygomorphic; calyx-tube more or less adnate to the ovary; lobes imbricate or valvate. Petals 4 or more, rarely 0, perigynous or epigynous, imbricate or valvate, rarely circinate. Stamens 4 or more, perigynous, 1-seriate; filaments free; anthers oblong, 2-celled, opening lengthwise or by valves, the connective often produced. Disk absent or annular or of separate glands between the stamens and ovary. Ovary inferior or nearly so, rarely superior, composed of 2 carpels often free at the apex, 2-celled; styles subulate, free, often recurved. Ovules 1 or more in each cell, pendulous from axile placentas. Fruit a capsule, woody. Seeds various, with thin fleshy endosperm and straight embryo.—Genera 18. Species 50.—Chiefly subtropical.

They yield stimulating expectorant balsams.

Among the products isolated are 1. hydrocarbons—cinnamene—; 2. aldehydes—benzoic, cinnamic, vanillin—; 3. acids—cinnamic—; 4. esters of cinnamic acid—ethyl, phenylpropyl—.

OFFICIAL:—*Hamamelis virginiana* Linn. (Austria, Great Britain, Italy, Japan, Norway, Sweden, Switzerland, Turkey); *H. virginica* Linn. (Belgium, France, Spain).

Liquidambar orientale Mill. (Denmark, Sweden); *L. orientalis* Miller (Austria, Belgium, France, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Switzerland, United States);= *Platanus orientalis* Pococke (Portugal); *L. styraciflua* Linn. (United States);=*L. macrophylla* Orst. (Portugal).

ALTINGIA Nor.

Trees. Leaves alternate, petioled, ovate or oblong, glandular-serrate, persistent; stipules deciduous or persistent. Flowers in dense heads; heads wrapped by a large bract, males racemose, females solitary. Male heads a mass of stamens with very short filaments, probably representing numerous achlamydeous flowers. Anthers obverse-pyramidal, the valves when young turned in till they reach the connective so that the young stamen is pseudo-4-celled; dehiscing longitudinally. Female heads of 12-20 flowers; calyces confluent, without limb. Petals 0 (some rudimentary stamens have been taken for petals). Ovary ¾-inferior, 2-celled; styles 2, separate, deciduous; ovules numerous, axile. Fruit-head globose, harsh. Seeds numerous; lowest 1-2 of each cell winged fertile, the upper without wing or embryo.—Species 3.—East Bengal to China and Malaya.

A. excelsa Noronha is used medicinally in Indo China.

1. **Altingia excelsa** Nor. in Verh. Bot. Genoot. ed. V, II (1827) 41.—PLATE 407A.

A leaf-shedding tree, all parts quite glabrous; leaves oblong to ovate-oblong, on a slender glabrous petiole, rounded at the base, acuminate, glandular-serrate, chartaceous, glabrous, conspicuously nerved, 10-12.5 cm. long; male flower-heads almost sessile, each

supported by a rather large, solitary, broad, silky-pubescent bract, forming a sort of catkin; female flower-heads long-peduncled, solitary, axillary; capsule almost immersed in the confluent calyces and forming a globular velvety-tomentose areolate rather woody fruit.

Distribution: Assam, Bhutan, Pegu, Mergui.—Java, Yunnan.

The resin is bitter, pungent, hot, and oily; antipyretic, aphrodisiac; cures leucoderma, bronchitis, biliousness, vesicular calculi, diseases of the bladder; used in scabies, itching, and excessive perspiration (Ayurveda).

The resin is bitter; tonic, carminative, expectorant; useful in catarrhs, sore throat, lung troubles, diseases of the brain, splenic enlargement, lumbago, kidney troubles, menorrhagia, earache; applied in scabies and leucoderma (Yunani).

This yields the resin known as "storax". In orchitis, it is not possible to use this semifluid resin on the inflamed testicle direct, but it is used over the scrotum and covered over with dry tobacco-leaves. I have used it with success in the early stages of hydrocele of the tunica vaginalis (K. R. K.).

In Indo China, the root-bark is considered astringent, depurative, and antisyphilitic.

Rassamala resin contains benzoic and cinnamic aldehydes.

Arabic: Basiasayal, Meaahesayelah—; *Assam:* Jutili—; *Burma:* Nantayok, Nantayop, Nantayu—; *Ceylon:* Rasamala—; *Deccan:* Silaras—; *Gujarat:* Silaras—; *Hindi:* Silaras—; *Indo China:* To hap binh khang—; *Malayalam:* Rasamala—; *Marathi:* Shilaras—; *Persian:* Aslelubni—; *Sanskrit:* Ashmapushpa, Chala, Chanchalatailaka, Dhumra, Dhumravarna, Java, Kalka, Kapichanchala, Kapinama, Kapisha, Kapitail, Karevar, Kritrima, Kritrimaka, Lepana, Muktimukta, Pavana, Pindatavara, Pindita, Pinyaka, Pishtaka, Pitasara, Sainhikarasa, Shaja, Shalakidrava, Siddha, Silhapindaka, Silhasara, Sugandhika, Tailakhya, Tailparni, Turashka, Vrikadhupa, Yava, Yavala—; *Tamil:* Neriyurishippal—; *Telugu:* Shilarasamu—; *Urdu:* Silaras—.

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tube short, adnate to the ovary at the base. Petals 4, entire, inserted on a fleshy disk. Stamens 8-12; anthers subsessile, multiloculate. Ovary 2-celled, ½-inferior, produced beyond the calyx into a fleshy cone; ovules 2 in each cell; style conical at the base, subulate; stigma bifid. Fruit coriaceous, ovoid or obconic, girt at the base with the reflexed persistent calyx-teeth. Seed germinating while the fruit is still on the tree; radicle elongate, perforating the apex of the fruit and descending from the tree to the mud.—Species about 5.—America, S. Africa to Japan.

R. mucronata Lam. is used medicinally in Indo China, the Philippine Islands, Brazil, Guiana, the West Indies, and West Africa.

1. **Rhizophora mucronata** Lam. Encyl. Méth. VI (1804) 189.—PLATE 408.

A large evergreen glabrous shrub or small tree; young branches thick, conspicuously marked with scars of fallen leaves and stipules. Leaves 7.5-20 by 4.5-10 cm., elliptic, acute, usually mucronate, glabrous, bright green above, paler, minutely rugulose and dotted with black dots beneath, base tapering; petioles 2-3.8 cm. long; stipules 5-7.5 cm. long, glabrous, minutely rugulose, caducous. Flowers pedicelled, in axillary, usually 3- (rarely 2-) flowered cymes slightly longer than the petioles; peduncles stout, 2-3.8 cm. long, from the axils of the leaves of the same year; pedicels short, rugose. Calyx 1.3-1.6 cm. long; lobes pale yellow coriaceous, triangular-oblong, subacute, glabrous, reticulate-rugose, keeled within, reflexed in fruit. Petals white, shorter than the calyx-lobes, oblong, obtuse, thick and fleshy, densely villous on the margins and less so on the inner faces. Stamens 8; anthers linear, acute. Fruit 3.8 cm. long, ovoid-conical, surrounded at the base by the persistent calyx-lobes; protruded radicle cylindric, sometimes reaching 60 cm. long before it falls from the tree.

Distribution: Along muddy shores and tidal creeks of India, Ceylon,—Tropics of the Old World and Australia.

The bark is a powerful astringent.

The bark is used as a cure for diabetes (Rheede).

In Indo China, the bark is given in hæmorrhage and angina.

Andamans: Bairada, Jumuda—; *Bengal:* Bhara, Bhora, Kamo—; *Betsimisaraka:* Voandrano—; *Bombay:* Hariya, Kandel—; *Brazil:* Mangue amarello, Mangue verdadeiro, Mangue vermelho—; *Burma:* Byu, Byuma, Pyu—; *Canarese:* Kandale—; *English:* Mangle, Mangrove—; *French:* Mangier, Manglier, Manglier noir, Paletuvier—; *Ilocano:* Oongon, Paracan—; *Indo China:* Dang, Duoc, Vet—; *Las Bela:* Timmar—; *Makran:* Timmar—; *Malay:* Bakau Korap, Belukap—; *Malayalam:* Panachikantal, Pikantal, Venkantal—; *Marathi:* Kandal—; *Mare:* Bongo—; *New Caledonia:* Aindieden, Bongo, Herelavalondon, Paletuvier, Paletuvier a bequilles, Petit paletuvier blanc—; *Sakalave:* Honkalahy, Honko—; *Sind:* Kamo, Kimro, Kunro—; *Sinhalese:* Kadol—; *South Africa:* Red Mangrove—; *Spanish:* Mangle—; *Sundriban:* Bhara—; *Swahili:* Mkoko—; *Tagalog:* Bacao, Bacauan, Pelotan, Pototan, Tangal, Tigasan—; *Tamil:* Kandal, Peykkandal, Sorippinnai—; *Telugu:* Adavipenna, Manjiponna, Ponna, Uppuponna—; *Tigré:* Gondel—; *Tupin:* Guaparaiba—; *Uriya:* Rai, Rohi—; *Visayan:* Bacao—; *Zulu:* umHluma—.

CERIOPS Arnott.

Shrubs or small trees with thick leafy branches. Leaves opposite, elliptic or obovate, entire; stipules interpetiolar, caducous. Flowers subcapitate; peduncles axillary. Calyx 5-6-merous, surrounded at the base by connate bracteoles; tube short, adnate to the ovary at the base; lobes coriaceous. Petals 5-6, inserted at the base of a 10-12-lobed fleshy disk, truncate or emarginate, appendiculate with clavate bristles. Stamens 10-12; filaments slender, inserted between the lobes of the disk; anthers oblong or linear, obtuse or acuminate. Ovary ½-inferior, 3-celled (at least above), produced beyond the calyx into a fleshy cone; ovules 2 in each cell, pendulous near its apex; style short; stigma simple. Fruit coriaceous, ovoid, girt above the base with the reflexed calyx-lobes, 1-celled. Seed 1, pendulous, germinating as in Rhizophora; cotyledons conferruminate; protruding radicle elongate, clavate.—Species 7.—Palaeotropic coast.

The genus has little therapeutical importance.

1. **Ceriops candolleana** Arn. in Ann. Nat. Hist. I (1838) 346; Wight Ic. t. 240.—PLATE 409.

A glabrous shrub or small tree 0.9-1.8 m. high; branchlets marked with the scars of fallen leaves and stipules. Leaves 5-10 by 3-5 cm. coriaceous, obovate-oblong, rounded at the apex, sometimes slightly emarginate, glabrous, much attenuated at the base; petioles 8-25 mm. long, rugose, glabrous. Flowers in axillary, peduncled, branched cymes; pedicels short, stout. Calyx 6 mm. long; lobes 5, oblong, subobtuse. Petals 5, white, shorter than the calyx, oblong-obovate, truncate or emarginate, furnished at the apex with 3 short clavate appendages, glabrous, with a strong mid-nerve at the back of the petal. Stamens 10, about as long as the petals, alternately long and short. Fruit slightly conical, 1.3-1.6 cm. long; protruded radicle sometimes reaching 30 cm. before falling, gradually thickening to near the apex and then becoming acute, deeply grooved and angled, reddish brown.

Distribution: Muddy shores and tidal creeks of India, Ceylon.—Tropics of the World.

The whole of the plant abounds in an astringent principle. The decoction of the bark is used to stop hæmorrhage, and applied to malignant ulcers. On the African Coast, a decoction of the shoots is used as a substitute for quinine.

Andamans: Mada—; *Bengal:* Goran—; *Ceylon:* Chirukandal—; *English:* Mangrove—; *Malay:* Tengah—; *Malayalam:* Ankantal—; *Sind:* Chauri, Kiri, Kirrari—; *Sundriban:* Goran, Guttia—; *Tagalog:* Bacao, Bacauan, Biuas, Ligasan, Tangal, Tigasan—; *Tamil:* Pandi-kutti—; *Telugu:* Gedera—; *Visayan:* Pototan, Tangung—.

KANDELIA Wight & Arn.

Species 1.—Tropical Asia.

1. **Kandelia Rheedei** Wight & Arn. Prodr. (1834) 311; Wight Ill. t. 89.—PLATE 410.

A small tree. Leaves 6.3-12.5 by 2.5-5.6 cm., elliptic-oblong, obtuse, dark green and polished above, reddish brown beneath, glabrous, base narrowed; petioles 8-16 mm. long; stipules 2-3.8 cm. long. Flowers in axillary cymes; peduncles longer than the petioles,

4-9-flowered. Calyx 1.6-2.2 cm. long, externally rugose; lobes narrow-linear, acute. Petals bifid; lobes divided into numerous capillary segments. Stamens indefinite, of unequal lengths. Fruit 1.3-2.5 cm. long, obclavate, girt above the middle with the reflexed calyx-lobes; protruded radicle 15-38 cm. long, cylindric, acuminate, usually not ridged nor grooved.

Distribution: Tidal shores of India, Ceylon.—Malaya.

The bark, mixed with dried ginger or long pepper and rose-water, is said to be a cure for diabetes (Rheede).

Bengal: Goria, Guria—; *Burma:* Madama—; *Canarese:* Kandale—; *Malayalam:* Kantal, Serukantal—; *Sundriban:* Goria—; *Tamil:* Kandal, Pukkandal, Tuvarkkandal—; *Telugu:* Kandigala—; *Uriya:* Rasunia, Rasuria, Rohisunia—.

COMBRETACEAE.

Trees or shrubs, erect or climbing. Leaves alternate or opposite, coriaceous or membranous, simple, entire; petiole often glandular at the top; stipules 0. Flowers usually hermaphrodite, rarely unisexual or polygamous. Calyx bracteolate at the base; tube adnate to the ovary and prolonged above it; limb 4-5 (rarely 6-8) -fid or -partite, its lobes valvate in bud, deciduous or persistent. Corolla 0, or petals inserted on the calyx, alternate with its lobes, valvate in bud. Stamens inserted with the petals, sometimes alternate with them, sometimes double their number, of which the alternate 5 are inserted higher than and opposite to the petals; filaments free, filiform or subulate. Ovary inferior, 1-celled, usually crowned with a disk; ovules 1-7 (usually 2-4), pendulous from the apex of the cell; style terminal; stigma usually simple. Fruit usually indehiscent, coriaceous or drupaceous, ovoid, angular, frequently winged, crowned in CALYCOPTERIS by the greatly enlarged calyx. Seed 1, exalbuminous; cotyledons large,

plaited or convolute.—Genera 16. Species 480.—Tropical and subtropical regions.

A. Petals absent. Calyx-limb (except in CALYCOPTERIS) deciduous
  1. Flowers spiked or racemed. Calyx-limb deciduous .... TERMINALIA.
  2. Calyx-limb much accrescent on the fruit .... CALYCOPTERIS.
  3. Flowers capitate. Calyx-limb deciduous .... ANOGEISSUS.

B. Petals 5-4
  Calyx-limb deciduous. Calyx-tube above the ovary, more than 13 mm. long .... QUISQUALIS.

Resiniferous astringent plants. The bark and fruit are often used medicinally.

OFFICIAL:—*Terminalia Chebula* Retz. (Great Britain).

TERMINALIA Linn.

Trees. Leaves alternate or subopposite, frequently crowded at the ends of the branches, often with glands on the petiole or at the base of the midrib beneath. Flowers green or white, rarely coloured, small, spicate (the spikes sometimes panicled), hermaphrodite or often the upper flowers on the spikes male and the lower hermaphrodite. Calyx-tube ovoid or cylindric, constricted above the ovary; limb of 5 short valvate triangular lobes, soon deciduous. Petals 0. Stamens 10, inserted on the calyx-lobes (the epigynous disk within them densely hairy), biseriate, the 5 lower opposite the calyx-teeth, the 5 upper longer and alternate with the calyx-teeth; filaments subulate or filiform, exserted. Ovary inferior, 1-celled; ovules 2-3, pendulous from the apex of the cell; style subulate, often thickened and villous at the base; stigma simple. Fruit ovoid, various in size and texture, smooth or angular or 2-5-winged, indehiscent, coriaceous. Seed solitary, exalbuminous; cotyledons convolute.—Species 120.—Tropics.

A. Fruit more or less fleshy, not winged, often angled
  I. Spikes simple (see also *T. pallida*)
      Leaves alternate, clustered at the ends of the branches
        Flowers at top of spike male
          1. Petiole glandular; base of blade cordate ...... 1. *T. catappa.*
          2. Petiole eglandular
              Petiole 4.5-10 cm. long .... 2. *T. belerica.*

II. Spikes panicled (excepting *T. pallida*)
Leaves not softly grey or almost silvery tomentose
1. Leaves glaucous; flowers glabrous .... 13. *T. pallida.*
2. Leaves not glaucous
Petiole glandular
* Fruit more or less distinctly 5-angled, obovoid from a cuneate base, sometimes ovoid or nearly globose, 2.5-4 cm. long .... 3. *T. chebula.*
** Fruit narrow, lanceolate, 5 cm. long .... 4. *T. citrina.*

B. Fruit dry with 2 equal wings
I. Fruit with the wings 7.5-10 cm. broad .... 9. *T. bialata.*
II. Fruit with the wings 2.5-5 cm. broad .... 8. *T. pyrifolia.*

C. Fruit with 5 equal acute wings
I. Leaves not broadly ovate
a. Fruit with short hard angles or wings, usually notched near the top, the lines on the wings oblique and curving upwards; leaves oblong or elliptic, usually crenulate; bark smooth .... 5. *T. arjuna.*
b. Fruit with long thin papery wings, usually rounded at top, lines on wings straight and horizontal
1. Fruit softly and minutely yellowish brown-velvety as are the leaves beneath, twigs and inflorescence; fruit, including wings about 4 cm. diam. .... 12. *T. coriacea.*
2. Fruit glabrous, large, usually 5 cm. diam.
Calyx villous with yellowish brown hairs as are the underside of the leaves, the twigs and inflorescence; glands near the base of the midrib large and stalked; panicles dense .... 6. *T. tomentosa.*
II. Leaves broadly ovate, 4-8 cm. long; wings of fruit narrow, 18 mm. long, 12 mm. broad .... 10. *T. oliveri.*

D. Fruit with 3 very unequal wings; flowers irregular
I. Front ridge of ovary growing out into a wing 18-25 mm. broad .... 7. *T. paniculata.*
II. The 2 lateral angles expanded into wings .... 11. *T. myriocarpa.*

The barks are in general mild diuretics, or fairly potent cardiac stimulants, or have both diuretic and cardiotonic properties.

The following are used medicinally in China—*T. chebula* Retz.—; in Indo China—*T. belerica* Roxb., *T. catappa* Linn., *T. chebula* Retz., *T. citrina* Fleming—; in the Philippine Islands—*T. catappa* Linn., *T. chebula* Retz.—; in the Malayan Archipelago—*T. catappa* Linn.—; in Jamaica—*T. latifolia* Swartz.—; in Brazil *T. argentea* Mart.—; in Guiana—*T. catappa* Linn.—; in La Reunion —*T. angustifolia* Linn., *T. catappa* Linn.—; in South Africa—*T. sericea* Burch.—; in Guinea—*T. macroptera* Guill. & Perr.—; in

Senegal—*T. avicennoides* Guill. & Perr.—; in Egypt—*T. chebula* Retz.—.

OFFICIAL:—The dried immature fruits of *T. chebula* Retz. (Great Britain).

1. **Terminalia catappa** Linn. Mantiss. (1771) 519; Roxb. Hort. Beng. 33; Fl. Ind. II (1832) 430; Wight Ic. 172.—PLATE 411.

About 25 m. high. Branches in horizontal whorls. Leaves alternate, clustered towards the ends of the branches, very short-petioled, obovate from a cordate but very narrow base, 15-25 cm., deciduous in the cold season, usually softly hairy when young, hairy or glabrous when adult, with 2 glandular depressions near the base of the midrib on the under side which are often obscure or wanting. Spikes solitary, axillary, simple, grey or rusty-tomentose or pilose, the upper flowers male, the lower hermaphrodite, the bracts minute. Calyx-teeth glabrous or nearly so within or without. Young ovary glabrous or hairy, 2.5-4 cm., ellipsoid, slightly compressed so as to show 2 ridges.

Wood red, with lighter coloured sapwood, hard. Pores moderate sized, scanty, joined by wavy, short, concentric bands of soft texture. Medullary rays fine.

Can be distinguished by the short petiole and the very narrow but cordate base of the blade. The leaves turn deep red in autumn before falling.

Distribution: Indigenous in the Andamans and adjacent islands and in the Malay Peninsula, in coast forests. Extensively planted in tropical India and Burma.

The fruit is bitter, sweet, acrid; cooling astringent to the bowels, aphrodisiac; useful in biliousness, bronchitis (Ayurveda).

The kernels yield upwards of 50 per cent of a pure bland oil, which may be substituted for almond oil. Kept for a long time, it deposits a large quantity of stearine. The bark is said to be astringent.

The juice of the young leaves is employed in Southern India to prepare an ointment for scabies, leprosy, and other cutaneous diseases, and is also believed to be useful internally for headache and colic.

In French Guiana, the astringent root bark is given in dysentery and diarrhœa; the stem bark is considered a cure for bilious fevers. The leaves are much used in the preparation of maturant and emollient ointments.

In La Reunion, the leaves and the bark are used as an astringent.

The bark is endowed with mild diuretic and fairly potent cardiotonic properties (Caius, Mhaskar, and Isaacs).

Andamans: White Bombway—; *Bengal:* Badam, Banglabadam—; *Betsimisaraka:* Atafa, Hatafa, Hatafana, Hatafo—; *Bicol:* Dalara, Dalinsi—; *Bombay:* Badam, Badami, Bangalibadam, Desibadam, Janglibadam—; *Canarese:* Badami, Kadubadami, Natubadami, Olegra, Urubadami—; *Ceylon:* Kottai—; *Deccan:* Badamehindi, Hindibadam, Janglibadam—; *English:* Indian Almond, Malabar Almond, Malay Almond—; *French:* Arbre àl'huile, Badamier de Malabar, Bois à canots, Bois de canot, Bois à huile—; *French Guiana:* Amandier, Badamier—; *Gujarat:* Badamalili, Deshibadam, Lilibadam—; *Hindi:* Badami, Hindibadam, Janglibadam—; *Ilocano:* Lugo, Pandan—; *Indo China:* Ban, Bang, Chambak barang, Co ba the tu thu, Pareang, Prang—; *La Reunion:* Badamier—; *Malay:* Katappa, Ketapang—; *Malayalam:* Ata, Kottakkuru, Nattubadam, Talitanna—; *Marathi:* Bengalibadam, Hiranibadam, Janglibadama, Natbadam—; *Mindanao:* Dalisay—; *North-Western Provinces:* Desibadam—; *Pampangan:* Calisai, Salaysay, Salisay, Talisay—; *Persian:* Badamehindi—; *Porebunder:* Badam—; *Portuguese:* Amendoeira, Guarda-sol—; *Sanskrit:* Desabadama, Grahadruma, Ingudi, Kshudrabadama, Kshudrabija, Tapasataruvu, Tailaphala, Vatama—; *Sinhalese:* Kotamba—; *Spanish:* Almendro de la India—; *Swahili:* Mkungu—; *Tagalog:* Salaysay, Salisay, Talisay—; *Tamil:* Amandi, Nattuvadumai, Pinga, Siruppinga, Vadumai—; *Telugu:* Badamu, Ingudi, Natubadamu, Tapasataruvu—; *Tulu:* Badamu, Katubadamu—; *Uriya:* Bodamo, Desiyobadamo—; *Visayan:* Banilac, Hintan, Hitam, Nato, Salaysay, Salisay, Talisay—.

2. **Terminalia belerica** Roxb. Corom. Pl. II (1798) 54, t.

198; Wight Ill. t. 91; Clarke in Hook. f. Fl. Brit. Ind. II, 445 (partim).—PLATE 412B.

A large deciduous tree, 10-20 m. high. Leaves gathered about the extremities of the branches, alternate, coriaceous, 10-20 by 7-15 cm., broadly elliptic or elliptic-obovate, rounded or rarely subacute or shortly acuminate, both surfaces puberulous when young, glabrous and reticulate when old, the margins entire, pellucid, base narrowed; main nerves 6-8 pairs, spreading, prominent, the midrib prominent on both surfaces; petioles 2.5-10 cm. long, without glands at apex. Flowers pale greenish yellow, with an offensive odour, in axillary slender spikes longer than the petioles but shorter than the leaves, those in the upper part of the spike male and very shortly pedicelled, those in the lower part hermaphrodite, sessile. Bracts linear, early caducous. Calyx pubescent outside, inside woolly with long brown hairs; teeth broadly triangular, acute. Young ovary always tomentose. Drupe 12-25 mm. diam., ovoid, grey, suddenly narrowed into a very short stalk, velvety, obscurely 5-angled when dried.

When mature the leaves are glabrous and usually punctate on the upper side. The punctations are much more permanent than in the other species.

The bark is bluish grey, with many fine vertical cracks. The wood is yellowish grey, hard, no heartwood; annual rings indistinct. Pores very scanty, large, frequently subdivided, joined by irregular wavy, concentric bands of soft loose cellular tissue.

Distribution: Throughout the forests of India, Burma and Ceylon below elevations of about 3,000 ft., except in the dry and arid region of Sind and Rajputana.

The bark is useful in anæmia and leucoderma.—The fruit is bitter, pungent, acrid; digestible, laxative, anthelmintic, useful in bronchitis, sore throat, biliousness, inflammations, strangury, asthma, and in diseases of the eye, the nose, the heart, and the bladder.—The seed is acrid, intoxicating; useful in thirst, vomiting, bronchitis, corneal ulcers; relieves "vata" (Ayurveda).

The fruit is bitter; astringent, tonic, attenuant, aperient, antipyretic; useful in dyspepsia, bilious headache, diarrhœa; applied to the eyes, to piles; brain tonic (Yunani).

In the Konkan, the kernel, with that of the marking nut, is sometimes eaten with betel-nut and leaf in dyspepsia; the fruit also is used as an astringent, usually in combination with chebulic myrobalans. There is no doubt about the narcotic properties of the kernel. The part used in medicine is the pulp.

In the Punjab, it is chiefly employed in dropsy, piles, diarrhœa and leprosy; also occasionally in fever. When half ripe, it is considered purgative, when fully ripe or dried, astringent. Mixed with honey, it is employed as an application in cases of ophthalmia.

The oil is considered a good application for the hair. The gum is believed to be demulcent and purgative.

Like other kinds of Terminalia, the Beleric myrobalans afford a yellow fixed oil which is prepared by the poorer classes in the Central Provinces and used as a substitute for ghee and as an application for rheumatism.

The fruit in combination with other drugs is prescribed for snake-bite (Charaka, Sushruta, Vagbhata, Sharangdharasamhita) and scorpion-sting (Sushruta).

The bark is a mild diuretic (Caius, Mhaskar and Isaacs).

The fruit is not an antidote to snake-venom (Mhaskar and Caius) or to scorpion-venom (Caius and Mhaskar).

The oil from the seeds has been examined for its constants by Shrikhande and Godbole (18th Ind. Sc. Congress; Nagpur, 1931).

Arabic: Balilaj, Batilaj, Beleyluj—; *Assam:* Bauri, Hulluch—; *Bengal:* Bahera, Baheri, Bahira, Bahura, Behera, Bhairach, Bohera, Bohora, Boyra, Buhuru—; *Bhil:* Yehera—; *Bombay:* Bahudda, Balra, Behada, Beheda, Behedo, Behara, Behda, Bhaira, Bherda, Bherdha, Hela, Goting, Yel, Yella—; *Burma:* Bankha, Pangan, Phanga, Phangasi, Phankhasi, Ruhira, Thitsein, Tissein—; *Canarese:* Santi, Tare, Tari, Vibhita, Vibhitaka—; *Central Provinces:* Bahera, Behara, Behera, Bjaira, Bihara, Toandi—; *Ceylon:* Tanti—; *Deccan:* Babra, Balda, Balra, Bairda, Batra, Bherda, Bulla, Yehala—; *English:* Bastard Myrabolan, Bedda Nuts, Belleric Myrobalan—; *French:* Badamier belleric, Myrabolan béléric—; *Garo:* Chirorae—; *Gond:* Banjir, Tahara, Taka—; *Gujarat:* Bahedamunjhad, Bahedo, Behaza, Beheda, Behedan, Bero, Sag—; *Hindi:* Bahera, Behara,

Behra, Bhaira, Bhairach, Bharla, Buhura, Bulla, Sagona—; *Hyderabad:* Ahera, Jhera—; *Indo China:* Bang nut, Mhut—; *Kadir:* Adumarudu—; *Khond:* Bahra—; *Kolami:* Lihung, Lupung—; *Konkani:* Gotting, Gutting—; *Kumaon:* Bahera—; *Lambadi:* Bedaro—; *Lepcha:* Kanom—; *Madras:* Tandi—; *Magahi:* Sacheng—; *Malay:* Jilawei—; *Malayalam:* Tanni, Tusham—; *Marathi:* Bahera, Baira, Balra, Beda, Beharda, Behasa, Beheda, Bherda, Bhirda, Hela, Goting, Sagwan, Vavara, Vela, Yehelabehada, Yela—; *Merwara:* Bahera—; *Nepal:* Barra—; *North-Western Provinces:* Bahera, Beharia, Buhera—; *Persian:* Balela, Balilah, Belayleh—; *Porebunder:* Bahedan, Bahedanunjhad—; *Portuguese:* Myrabolano bellerico—; *Punjab:* Bahera, Bahira, Balela, Bayrah, Behera, Birha—; *Sanskrit:* Aksha, Anilaghnaka, Baheduka, Bahuvirya, Bhutavasa, Bibhitaki, Harya, Kali, Kalidruma, Kalinda, Kalivriksha, Kaliyugalaya, Kalpavriksha, Karshaphala, Kasaghna, Kushika, Sanvarta, Tailaphala, Talaphala, Tilapushpaka, Tusha, Vasanta, Vibhitaka, Vishaghna—; *Santal:* Lopong—; *Sind:* Bayrah—; *Sinhalese*: Bulu, Bulugaha—; *Tamil:* Akkam, Akkana, Akkandam, Ambalatti, Kalanduri, Kalitturumam, Kandugam, Sadagam, Sirottam, Tanri, Vibidagam—; *Telugu:* Bhutavasamu Tadi, Tandra, Vibhitakamu—; *Tulu:* Dandi—; *Urdu:* Behera—; *Uriya:* Bahada—.

3. **Terminalia chebula** Retz. Obs. V (1789) 31; Roxb. Corom. Pl. t. 197.—PLATE 413.

A moderate sized or large deciduous tree, attaining 25-30 m. in height. Leaf-buds, branchlets and youngest leaves with soft, shining, generally rust-coloured hairs. Leaves 7-20 cm. by 4-8 cm., glabrous or nearly so when mature, not clustered, distant, alternate or subopposite, elliptic-oblong, acute, rounded or cordate at base, penninerved, secondary nerves 6-8 pairs, arching, prominent; petioles 2-5 cm. long, pubescent, usually with 2 glands near the top. Flowers all hermaphrodite, 4 mm. across, sessile, dull-white or yellow, with an offensive smell. Spikes sometimes simple, usually in short panicles, terminal and in the axils of the uppermost leaves; bracts exceeding the flowers, subulate or lanceolate, hairy, conspicuous

among the buds but soon deciduous. Calyx campanulate, 3 mm. long, flat at the base expanding a little towards the mouth, glabrous outside, hairy within; teeth 5, short, sometimes obscure. Drupe pendulous, 2-4 cm. long, ellipsoid or obovoid from a broad base, glabrous, more or less 5-ribbed, when dry yellowish green; stone oblong, bony, very thick, obscurely angled.

Bark 6 mm. thick, dark brown with many generally shallow vertical cracks. Wood very hard, brownish grey with a greenish or yellowish tinge, with an irregular small dark purple heartwood, close-grained.

Distribution: Throughout the greater part of India, Burma and Ceylon, up to 5,000 ft. in the outer Himalayan and up to 6,000 ft. in Travancore.

There are seven varieties.—The fruit is dry and heating; stomachic, tonic, carminative, expectorant, anthelmintic, antidysenteric, alterative; useful in asthma, sore throat, thirst, vomiting, hiccough, eye diseases, diseases of the heart and the bladder, strangury, vesicular calculi, urinary discharges, ascites, biliousness, inflammations, tumours, bleeding piles, typhoid fever, leucoderma, dyspnœa, itching, pain, constipation, anæmia, gout, elephantiasis, delirium (Ayurveda).

The unripe fruit is astringent and aperient, useful in dysentery and diarrhœa.—The ripe fruit is purgative, tonic, carminative; enriches the blood; good in ophthalmia, diseases of the spleen, piles, cold in the head; strengthens the brain, the eye, the gums; used in paralysis (Yunani).

The fruits are used as a medicine for sore-throat, by the Paharias in Sikkim.

A fruit, finely powdered, is used as dentifrice. Said to be useful in carious teeth, bleeding and ulcerations of the gums (B. D. Basu).

A fruit, coarsely powdered and smoked in a pipe, affords relief in a fit of asthma. A decoction of the fruit is a good astringent wash. A fine paste, obtained by rubbing the fruit on a rough stone with little water, mixed with the carron oil of the Pharmacopœia and applied to burns and scalds, effects a more rapid cure than when carron oil alone is used.

Water in which the fruits are kept for the night is considered a very cooling wash for the eyes. The ashes mixed with butter form a good ointment for sores.

The fruit in combination with other drugs is prescribed for snake-bite (Charaka, Sushruta, Vagbhata, Bhavaprakasha, Yogaratnakara, Sharangdharasamhita, Vaidyavinoda, Rasaratnakara) and scorpion-sting (Sushruta, Vagbhata, Haritasamhita, Vaidyavinoda, Rasaratnakara).

The bark is endowed with both diuretic and cardiotonic properties (Caius, Mhaskar and Isaacs).

The fruit is useless in the symptomatic treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

A chemical examination of the oil from the seeds is to be found in *Journ. Chem. Soc.*, 1893.

Assam: Hilikha—; *Bengal:* Haritaki—; *Berar:* Beyarah—; *Bhabar:* Harar—; *Bombay:* Harda, Hirda—; *Burma:* Pangah—; *Cambodia:* Srama—; *Canarese:* Alale, Anile, Arale, Harade, Haritaki—; *Central Provinces:* Harra, Hirdi—; *Chinese:* He Li Le, Pi Li Le, P'o Lo Te—; *Deccan:* Halra, Harda, Harla—; *English:* Black Myrobalan, Chebulic Myrobalan—; *Garhwal:* Haira—; *Gond:* Harro, Hir, Horda, Karka, Majoka—; *Gujerati:* Hirdo—; *Hindi:* Har, Harara, Harra—; *Indo China:* Chieu lieu, Kha li lac, Kha tu, Sramar, Xang—; *Kolami:* Harda, Rola—; *Konkani:* Ordo—; *Lepcha:* Salimkung, Silim—; *Magahi:* Kajo—; *Malayalam:* Divya, Katukka, Kayastha, Putanam—; *Marathi:* Habra, Hirada, Hirda—; *Nepal:* Harra, Herro—; *North-Western Provinces:* Har, Haraira, Harara—; *Portuguese:* Mirabolanos—; *Punjab:* Halela, Har, Harrar, Hurh—; *Sanskrit:* Abhaya, Amogha, Amruta, Avyatha, Balya, Bhishagvara, Bhishakpriya, Chetaki, Chetamaki, Devi, Divya, Girija, Haimavati, Haritaki, Himaja, Jaya, Jivanika, Jivanti, Jivapriya, Jivya, Karkatasringi, Kayastha, Nandini, Pachani, Panjarasa, Pathya, Pramatha, Pranada, Prapathya, Putana, Rasayanaphala, Reshaki, Rohini, Rudrapriya, Shaka, Shakrasrishta, Shiva, Shreyasi, Sudha, Sudhodbhava, Triphala, Vanatikta, Vayastha, Vijaya—; *Santal:* Rol—; *Saora:* Karka—; *Sikkim:* Hana, Silimkung—; *Sind:* Har—; *Sinhalese:* Aalu, Aralu—; *Tamil:* Amagola, Arabi, Aridadi, Attan, Kadu,

Kadukkay, Kagodagasingi, Nechi, Pattiyam, Piradamai, Seya, Sidegi, Singi, Sirottam, Sittilai, Siva, Sivandi, Taduvairi, Tuvarchigai, Urogini, Vayadaram—; *Telugu:* Haritaki, Karaka, Karakkaya, Nallakaraka, Resaki, Sringitiga—; *Tulu:* Anile—; *Urdu:* Haejarad—; *Uriya:* Horida, Horitoki, Jonghihorida, Karedha—.

4. **Terminalia citrina** Fleming in As. Res. XI (1810) 183. —Plate 412A.

A tree, reaching about 25 m. in height. Leaves subopposite, 7-16 cm., thickly coriaceous, elliptic or elliptic-lanceolate, when mature glabrous shining, the interstices of the nerves beneath with sunk close white tomentum; petiole 12 mm. long, usually with 2 glands at the top or on the base of the leaf beneath. Spikes terminal and lateral often panicled. Bracteoles linear, conspicuous on the young spikes. Flowers all hermaphrodite. Calyx-teeth glabrous without, hairy within. Young ovary glabrous. Fruit nearly 5 cm. long, oblong-lanceolate, while fresh obscurely 5-angular.

Can be distinguished from *T. chebula* by the straighter stem, brighter foliage and narrower fruits.

Bark light grey, exfoliating with few large flakes. Wood grey with an irregular dark heartwood of small size, sometimes absent. Though the structure of the wood is similar to that of *T. chebula* to which *T. citrina* is closely allied, the pores are smaller and the concentric rings much more marked and prominent.

Distribution: Assam, Maimansingh, Dacca, Tenasserim, Nicobars, Malay Peninsula.

The fruit has the same properties as that of *T. chebula.*

The bark is endowed with both diuretic and cardiotonic properties (Caius, Mhaskar, and Isaacs).

Assam: Hilika, Silika, Silikka—; *Bengal:* Haritaki, Harra—; *Burma:* Kyu—; *Cachar:* Hortaki—; *English:* Citrine Myrobalan—; *Indo China:* Chieu lieu xanh, Smo, Su mo—; *North-Western Provinces:* Hariha, Harira—.

5. **Terminalia arjuna** W. & A. Prodr. (1834) 314 (in nota). —Plate 414.

A large tree with huge often buttressed trunk and horizontally spreading branches; bark smooth grey, flaking off in large flat pieces.

Leaves usually subopposite 10-15 by 4-7 cm., oblong or elliptic-oblong, obtuse or subacute, pale dull green above, pale brown beneath, shallowly crenate-serrate in the upper part or sometimes throughout, base rounded or cordate, often unequal-sided; main nerves arcuate, 10-15 pairs, veins reticulate, pellucid; petioles 6-10 mm. long, with 1 or usually 2 prominent glands at the top immediately below the leaves. Flowers sessile, in short axillary spikes or in terminal panicles; bracteoles linear-lanceolate, shorter than the flowers, caducous. Calyx glabrous. Teeth triangular. Ovary quite glabrous; disk clothed with yellowish or reddish hairs. Drupe 2.5-5 cm., ovoid- or obovoid- oblong, fibrous-woody, glabrous, dark brown, with 5 hard projecting wings striated with numerous curved veins.

Bark smooth, pinkish grey. Sapwood reddish white, heartwood brown, variegated with darker coloured streaks.

Distribution: Throughout the greater part of India. In the sub-Himalayan tract, Chota Nagpur, Central India, Central Provinces, parts of the Bombay and Madras Pres., Ceylon.

The bark is acrid and sweet, cooling and heating; alexiteric, styptic, tonic, antidysenteric; useful in fractures, ulcers, blood diseases, intoxications, urinary discharges, "kapha", biliousness, strangury, diseases of the heart, anæmia, excessive perspiration, asthma, tumours, leucoderma, and false presentations of the fœtus; allays thirst and relieves fatigue (Ayurveda).

The bark is bitter; expectorant, aphrodisiac, tonic, diuretic; useful in biliousness, externally in wounds and fractures both externally and internally in gleet and urinary discharges (Yunani).

In fractures and contusions, with excessive ecchymosis, powdered *arjun* bark is recommended to be taken internally with milk. A decoction of the bark is used as a wash in ulcers and chancres.

The bark is astringent and febrifuge, the fruit tonic and deobstruent, the juice of the fresh leaves is a remedy for earache.

The bark is useful in bilious affections, and as an antidote to poisons.

In Kangra, the bark is used to sores, etc. (Stewart).

The ashes of the plant are prescribed for snake-bite (Sushruta), and the bark for scorpion-sting (Vagbhata).

. . . " Charaka in his Samhita distinguishes between " arjuna " and " asna." He credits both with astringent and diuretic properties, but does not prescribe either in cardiac troubles.

" Sushruta in the chapter Hridroga-Pratishedha (medical treatment of the diseases of the heart) of the Uttara-Tantra of his Samhita gives a complete survey of heart diseases and their treatment without any mention of either " arjuna " or " asna ".

" Vaghbhata was the first to prescribe the bark of " arjuna " or " kukubha " in heart disease. The practice was then recommended by Chakradatta, Bhava-Misra, and all subsequent commentators on Ayurveda. Later writers on the indigenous drugs of India had only to transcribe, and most of them did it.

" Ainslie (1826) speaks of Arjuna (*T. alata*) as possessing antifebrile qualities and being used, when powdered and mixed with oil, for aphthae of adults and infants. Now, according to Dymock, it is the bark of *T. tomentosa* which, powdered and mixed with oil, is used for aphthae.

" Dymock gives but scanty information as to the chemical composition of the bark of *T. arjuna:*—the ash amounts to 34 per cent of almost pure calcium carbonate; the watery extract is 23 per cent, with 16 per cent tannin; very little colouring matter besides the tannin is extracted by alcohol.

" Ghoshal (1909) was the first to investigate into the chemical composition and the physiological properties of what purported to be the bark of *T. arjuna.* He reported the presence of sugar, tannin, a colouring matter, a body glucosidal in nature, and carbonates of calcium and sodium with traces of chlorides of alkali metals. From experiments on frogs, rabbits, and men, he concluded that the drug is a very valuable remedy in heart diseases, specially where a combined tonic and stimulant action is necessary.

" Koman (1919-20) reported unfavourably about the efficacy of the drug:—" A decoction of the bark was administered to a case of valvular disease of the heart with palpitation and pain over the region of the heart. He did not derive any benefit from its administration."—" A liquid extract was administered in six cases of valvular diseases of the heart with failure of compensation. The patients

did not derive any benefit from its use."—Koman treated altogether twenty cases, and came to the conclusion that the drug is " not useful."

" In 1923, Chopra reported that Dr. S. Ghosh had, after a great deal of hard work extending over many months, isolated from *Terminalia Arjuna* or the *Arjuna myrobalan* (" arjun " or " kashu ") a glucoside in a pure condition which, when injected intravenously in animals, produced a small though a persistent rise of blood pressure. In 1924, while admitting that he was not yet in a position to give any definite opinion about the therapeutic value of the drug, he found that alcoholic extracts produced beneficial effects in a number of cases of cardiac failure who did not react well to the digitalis bodies. The therapeutic properties seemed to be associated with a glucoside obtained in a state of hydrolysis. This view received strong support one year later (1925) from the isolation of two glucosides. However, the note sounded in 1926 was less optimistic, and we were told that *T. Arjuna* has little action as a cardiac tonic. Finally, in 1929, Chopra and Ghosh published the results of their investigation into the chemistry, pharmacology, and therapeutic action of *T. Arjuna*. The bark was obtained from a reliable source, and was dried in air. The results of the chemical analysis were summarised as follows:—(1) about 12 per cent of tannins, consisting mainly of pyrocatechol tannins; (2) some colouring matters; (3) an organic acid with a high melting point and a phytosterol; (4) an organic ester easily hydrolysed by mineral acids; (5) large amounts of calcium salts with smaller amounts of aluminium and magnesium salts; (6) sugar, etc. The authors concluded that:—(1) An analysis of the bark of *Terminalia Arjuna* does not reveal the presence of any active principles of the nature of alkaloid, glucoside, or essential oil. With the exception of large amounts of calcium salts, tannins, organic acids, an organic ester and sugars, no other substances could be detected. (2) Different fractions obtained during the course of analysis from the bark including the petroleum ether, alcoholic and aqueous extracts, and colouring matter were found not to show any marked physiological activity. (3) An alcoholic extract prepared from the bark was tried on a number of patients suffering from cardiac decompensation, but it did not show any appreciable effects such as

are produced with the cardiac tonic drugs of the British Pharmacopœia.

" Meanwhile (1926) the results we had obtained with " arjun " from the local bazaar showed that, except for diuretic properties, the drug was pharmacodynamically inert. We then procured authentic samples of both *T. Arjuna* and *T. tomentosa.* Things turned out to be as we had expected. The two barks were so very similar in appearance that confusion was not only possible but pardonable. The bark of *T. Arjuna* was found to be inert while that of *T. tomentosa* had an action on the heart (1926).

" The pink coloured barks of *T. arjuna, T. coriacea, T. pallida, T. paniculata,* and *T. tomentosa* are generally mistaken for one another and are being exhibited and sold indiscriminately as " arjun " (Caius, Mhaskar, and Isaacs)."

The ashes are not an antidote to snake-venom (Mhaskar and Caius) and the bark is useless in the treatment of scorpion-sting (Caius and Mhaskar).

A chemical examination of the bark has been carried out by Janakiram and Guha (17th Ind. Sc. Congress; Allahabad, 1930).

Assam: Orjun—; *Baigas:* Kahu—; *Banda:* Kowa—; *Bengal:* Arjun, Arjuna, Kahu—; *Bombay:* Anjan, Arjun, Arjunasadra, Jamla, Kowa—; *Burma:* Toukhyan—; *Canarese:* Arjuna, Bilimatti Holematti, Kakubha, Nirmatti, Toramatti—; *Central Provinces:* Kahua, Kow, Kowah, Kowha, Saj—; *Cuddapah:* Tandra—; *Deccan:* Kara—; *English:* White Murdah—; *Gond:* Arjun, Koha, Mangi—; *Gujerati:* Arjunsadada, Arjunasadra, Dhaulasadr, Sadado—; *Hasada:* Kodradaru—; *Hindi:* Anjan, Anjani, Arjan, Arjun, Arjuna, Jamla, Kahu, Kahua, Kaugach, Khawa, Koha, Kowa—; *Khond:* Mardi—; *Kolami:* Garahatana—; *Konkani:* Arjun, Holematti, Nadiain—; *Malayalam:* Marutu, Vellamarutu—; *Marathi:* Anjan, Arjun, Arjuna, Arjunladada, Azun, Sadura, Sanmadat, Savimadat—; *Melghat:* Arjun—; *Mundari:* Garahatana—; *Naguri:* Kadradaru—; *North-Western Provinces:* Anjani, Arjan—; *Punjab:* Arjan, Jumla—; *Sanskrit:* Arjuna, Chitrayodhi, Dhananjaya, Dhanvi, Dhavala, Gandiri, Gandivi, Indradru, Indradruma, Indrasunu, Kakubha, Karaviraka, Karnari, Kaunteya, Kiriti, Krishnasarathi, Nadisarja,

Pandava, Partha, Phalguna, Prithaja, Savyasachi, Shambara, Shivamallaka, Vairantak, Vira, Virataru, Viravriksha—; *Santal:* Kanha—; *Sinhalese:* Kumbuk—; *Tamil:* Attumarudu, Kulamarudu, Marudu, Nirmarudu, Vellaimarudu—; *Telugu:* Kakubhamu, Erumaddi, Maddi, Tellamaddi, Tittumaddi—; *Urdu:* Arjan—; *Uriya:* Orjuno, Porjonyosahajo—.

6. **Terminalia tomentosa** W. & A. Prodr. (1834) 314 (non Mart.).—T. t. var. *typica* C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 447.—PLATE 415.

A large tree. Twigs villous. Leaves coriaceous, villous on the under surface, up to 18 by 8 cm., elliptic-oblong, obtuse or even emarginate or slightly acute at the apex, rounded or cordate at base, nerves many, prominently parallel, glands near the base of the midrib large and stalked. Panicles of spikes dense, villous. Bracteoles linear. Calyx villous with yellowish brown hairs. Fruit large, glabrous, usually 5 cm. diam., including the 5 equal wings.

Bark rough, not fissured; wood hard, dark brown.

Distribution: Common throughout India, except in Sind and Rajputana.

The bark is bitter and styptic; useful in ulcers, " vata ", fractures, hæmorrhages, bronchitis (Ayurveda).

A decoction of the bark is taken internally in atonic diarrhœa, and locally as an application to weak indolent ulcers.

Sushruta recommends the ashes of the plant in the treatment of snake-bite.

The bark has both diuretic and cardiotonic properties (Caius, Mhaskar, and Isaacs).

The ashes are not an antidote to snake-venom (Mhaskar and Caius).

Almora: Saj, Shaj; *Arcot:* Kalimarudai, Murada—; *Assam:* Amari—; *Bengal:* Asan, Ashan, Piasal, Piashal, Usan—; *Berar:* Ain, Saddra—; *Bhabar:* Sain—; *Bhil:* Madge—; *Bijnor:* Sain—; *Bombay:* Ain, Asna, Kenjal, Marthi, Sadada, Sadri, Sag—; *Bundelkhand:* Sadar—; *Burma:* Hpankha, Taukhyan, Toukhyan—; *Canarese:* Aini, Banapu, Bhudri, Hebhuluve, Karimatti, Kudurekivigena, Matti, Soheno, Sohonne—; *Central Provinces:* Barsaj, Sadur, Saj, Saja,

Sijra—; *Deccan:* Dudiamaddi, Holda, Janglikaranj, Karkaya, Sadora—; *Dehra Dun:* Sain—; *English:* Black Murdah—; *Garhwal:* Asin—; *Gond:* Maru—; *Gujerati:* Ain, Hadri, Sadada, Sadra, Sadri, Sajada, Sajadio—; *Hindi:* Ain, Asaina, Asan, Asna, Assain, Kauha, Sadri, Sain, Saj, Sein—; *Hyderabad:* Dudimaddi, Holda, Karakaya, Sadora—; *Khond:* Asono, Mardi—; *Kolami:* Hatana, Matnak—; *Konkani:* Assan, Mart, Marti—; *Koya:* Maddi—; *Lambadi:* Shadlero—; *Lepcha:* Taksor—; *Malayalam:* Karimarutu, Marutu, Tempavu—; *Marathi:* Ain, Madat, Sadada, Sadri, Saj, Yen—; *Melghat:* Athna—; *Mewar:* Hadri, Hag, Saddr, Sadri, Sader, Sag—; *Mundari:* Hatanadaru—; *Nimar:* Hadri, Hag, Saddr, Sader, Sadri, Sag—; *North-Western Provinces:* Asain, Asin, Sain, Saj—; *Porebunder:* Sajada—; *Portuguese:* Mareta—; *Punjab:* Aisan, Arjan, Asan, Asun, Sain, Sein—; *Rajbanshi:* Jhan—; *Reddi:* Maddi—; *Saharanpur:* Sain—; *Sanskrit:* Dharaphala, Krishnatvaka, Nissaraphalaka, Sajada, Saradru, Shyamasaraka, Vanajavriksha, Viravrikshaka—; *Santal:* Atnak—; *Saora:* Nallamaddi—; *Sinhalese:* Kumbuk, Kumuk—; *Taleing:* Chouchong—; *Tamil:* Aruchanam, Kagubam, Kalimarudu, Karumarudu, Karuppumarudu, Marudam, Marudu, Mikkuvam, Pudavam—; *Telugu:* Maddi, Nallamaddi, Nelamadu, Inumaddi—; *Uriya:* Kolashahajo, Pondosahajo, Sahajo—.

7. **Terminalia paniculata** Roth. Nov. Sp. (1821) 383.—PLATE 416.

A large tree; young parts rusty-tomentose. Leaves coriaceous, the upper alternate, the lower opposite, 10-24 by 4-8 cm., oblong, acute or acuminate, nearly glabrous, pale brown, more or less pubescent and finely reticulately veined beneath, usually with 2 glands near the base of the midrib below, base cordate or rounded, often inequilateral; main nerves 10-15 pairs, parallel, arcuate; petioles 12-15 mm. long, pubescent. Flowers sessile, in ample, rusty-pubescent panicles; bracts pubescent, acuminate, free portion of calyx glabrous, reddish brown, cup-shaped, the inside clothed with long brown hairs, ovary with 5 rounded ridges, densely and softly pubescent. Fruit 6-12 mm. long, sessile, rusty-tomentose, closely set in

dense spreading panicles, the front ridge of ovary growing out into a wing 18-25 mm. broad, the other 2 wings hardly 3 mm. broad.

Bark dark brown, cracked, peeling off in flat flakes. Wood grey, or pale brown, with darker heartwood, very hard.

Distribution: Western regions of the Peninsula from Bombay through Kanara and Malabar to Travancore, up to 2,000 ft., Coorg, Nilgiris, Anamalais, Cuddapah, Bellary.

The country people use the juice of the fresh flowers rubbed with the root of *Cocculus villosus* as a remedy in cholera, and in poisoning with opium; 4 tolas of the juice with an equal quantity of guava bark juice is given frequently. In parotitis, the juice with ghi and rock salt is applied.

The bark has both diuretic and cardiotonic properties (Caius, Mhaskar, and Isaacs).

Anamalais: Pillaimarda, Pumarda—; *Bombay:* Kindal, Kinjal—; *Canarese:* Honagalu, Honalu, Hulive, Huluve, Maruva, Matti—; *English:* Flowering Murdah—; *Konkani:* Quinzol—; *Malayalam:* Marutu, Pemarutu, Pullamarutu, Pumarutu, Vemmarutu—; *Mangalore:* Marwa—; *Marathi:* Kindal, Kinjal—; *Tamil:* Ilaikkadukkay, Marudu, Peykkadukkai, Pulatti, Pulavai, Pulavaimarudu, Pumarudu, Vadamarudu, Venmarudu—; *Telugu:* Nimiri, Pulamaddi, Puligi, Putakarakkaya, Putamanu, Putanallamanu—; *Tulu:* Maruve—.

8. **Terminalia pyrifolia** Kurz. For. Fl. Burm. I, 457.

A large deciduous tree, often stunted, glabrous except the innovations and spikes. Leaves crowded towards the ends of the branches, oblong- or broadly- lanceolate, glabrous 5-10 cm. long, coriaceous, narrowed into the petiole; petioles 2-4 cm. long, without glands. Spikes simple, very slender. Calyx densely tawny or brown-pubescent. Fruit with the 2 wings 2.5-5 cm. broad, the seed-portion being keeled on one side.

Distribution: Pegu and Tenasserim.

The bark is a fairly potent cardiac stimulant (Caius, Mhaskar, and Isaacs).

Burma: Leinpen—.

9. **Terminalia bialata** Steud. Nom. ed. II, II, 668.

A large tree. Leaves alternate, crowded at the ends of the branches, oblanceolate, narrowed into a very long petiole, perfectly glabrous, blade 15-23 cm. long, petiole 7-10 cm. long. Spikes axillary, simple, pubescent, as long as the leaves. Bracts caducous, not longer than the buds, apex often inflexed. The upper flowers male, the lower hermaphrodite. Ovary and calyx densely pubescent. Calyx-teeth hairy within. Wings 2, broad, striate and softly pubescent. Fruit with the wings 7-10 cm. broad.

Distribution: Andamans.

The bark is a fairly potent cardiac stimulant (Caius, Mhaskar, and Isaacs).

Andamans: Chugalam, White Chuglam—; *Burma:* Leinben—.

10. **Terminalia oliveri** Brandis in Hook. Ic. Pl. (1892) t. 2202.

A moderate sized glabrous tree with irregularly shaped, often channelled stem. Leaves subopposite, broadly ovate, blade 4-8 cm. long, secondary nerves 5-6 pairs; petiole 6 mm. long. Flowers small, nearly glabrous, in slender terminal panicles. Wings of fruit 5, narrow, membranous, 18 mm. long, 12 mm. broad.

Distribution: Upper Burma.

The bark is endowed with both diuretic and cardiotonic properties (Caius, Mhaskar, and Isaacs).

Burma: Than—.

11. **Terminalia myriocarpa** Heurck & Muell. Arg. Obs. Bot. 215.

A very large evergreen tree. Young shoots rusty pubescent. Leaves from a rounded base, elliptic-oblong; blade 10-30 cm. long, secondary nerves numerous, parallel; petiole thick, 6-8 mm. long, with 1 or 2 prominent cylindric glands at the top. Flowers small, in long slender spikes arranged in ample terminal panicles; bracteoles very short, villous. Calyx nearly glabrous within. Young ovaries villous. Fruit 4 mm. long, exceedingly numerous, minutely villous,

3-cornered, the 2 lateral angles expanded into wings which are 6 mm. wide and puberulous, the third acute, hardly winged.

Distribution: E. Himalaya from Nepal eastwards up to 5,000 ft. Bhutan, Abor Country, Assam, Upper Burma.

The bark is a fairly potent cardiac stimulant and a mild diuretic (Caius, Mhaskar, and Isaacs).

Assam: Hollock, Jhalna—; *Lepcha:* Sungloch—; *Nepal:* Panisaj—.

12. **Terminalia coriacea** Wight & Arn. Prod. (1834) 315. —*T. tomentosa* var. *coriacea* C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 448.—*Pentaptera coriacea* Roxb. Hort Beng. (1814) 34.

A large tree in suitable localities, otherwise often stunted. Leaves subopposite, short-petioled, elliptic- ovate or -oblong, obtuse and often emarginate at the apex, unequally cordate at base with usually 1 or 2 sessile glands at the base of the midrib beneath, up to about 25 by 11 cm., softly and minutely yellowish brown-velvety beneath. Panicles terminal and from the exterior axils, composed of a few, simple, long, cylindric, yellowish brown velvety spikes. Flowers sessile, hermaphrodite, crowded, small, dull yellow, with the outside hoary. Bracts linear. Calyx 5- or 6- cleft, hoary without, very hairy within; in the bottom, round the insertion of the style, 5 or 6 glands covered with hair. Fruit, including the 5 wings almost 4 cm. diam., minutely yellowish brown velvety.

Distribution: Madras Presidency, Deccan, on dry hills in deciduous forest, chiefly in the Ceded Districts and up to 4,500 ft., as at Horsleykonda, mountains of the Coromandel Coast, hills of Malabar.

The bark is a fairly potent cardiac stimulant (Caius, Mhaskar, and Isaacs).

Canarese: Banapu—; *English:* Leathery Murdah—; *Tamil:* Anaimikkuvam, Sadagam—.

13. **Terminalia pallida** Brandis Ind. Trees (1906) 308.

A small evergreen tree. Leaves clustered at the ends of the branchlets, alternate, glaucous, thick, ovate, rounded or attenuate at base, obtuse or emarginate at apex; petiole short, orange-coloured.

Flowers in simple spikes, glabrous. Fruit obovate, very faintly 5-ridged when dry, glabrous, base narrow.

Distribution: Madras Presidency, Deccan, Cuddapah, Kurnool, N. Arcot, Chingleput, up to 2,000 ft.

The bark has mild diuretic properties (Caius, Mhaskar, and Isaacs).

Tamil: Vellaikkadukkay—; *Telugu:* Tellakaraka, Velamakaraka.—

CALYCOPTERIS Lam.

Species 1.—Indo Malayan.

C. floribunda Lam. is used medicinally in Cambodia.

1. **Calycopteris floribunda** Lam. Tab. Encycl. II (1793) 485, t. 357.—PLATE 417A.

A scandent shrub; young branches slender, rusty-puberulous. Leaves opposite, 7.5-12.5 by 3.2-5.7 cm., ovate-lanceolate or elliptic-oblong, acute or acuminate, both surfaces more or less tomentose, the lower rusty and pitted, base usually rounded; main nerves 5-8 pairs, rather prominent beneath; petioles 6-10 mm. long. Flowers sessile, yellowish green, in fulvous-pubescent terminal panicles; bracteoles short, lanceolate, pubescent. Calyx densely hairy within at the mouth of the tube; tube produced above the ovary; lobes accrescent 1.9-2.2 mm. long in fruit, scarious, broadly linear-lanceolate, acute, strongly 3-nerved and reticulately veined, tomentose. Stamens unequal, much shorter than the calyx-lobes. Ovary densely villous outside; ovules 3, pendulous from the apex of the cell with long funicles. Fruit 8 mm. long, oblong or ellipsoid, 5-ribbed, pubescent or tomentose, crowned by the persistent calyx-lobes.

Distribution: Western Peninsula in deciduous forests, Orissa, Assam, Chittagong, Upper and Lower Burma.—Malaya.

The leaves are considered laxative and anthelmintic. The juice is given in puerperal fever, and applied to the body as a diaphoretic.

The leaves are bitter and astringent. They are chewed and the juice swallowed as a remedy for colic. The root ground to a paste

with that of *Croton oblongifolium* is applied to bites of the phoorsa snake *Echis carinata*. In jaundice, the fruit and various spices, of each one part, are made into a compound powder, of which the dose is two mashas. The fruit, with the root of *Grewia pilosa*, is rubbed into a paste with honey and applied to ulcers.

Bapat recommends the root in the topical treatment of snake-bite; but the root is useless as an external application in the treatment of snake-bite (Mhaskar and Caius).

In Cambodia, the stems and leaves are considered tonic and depurative, they are administered as an infusion during the fifteen days which follow delivery.

Burma: Kyutnenway—; *Cambodia:* Khsuos—; *Canarese:* Hanjarikekuchu, Kuppasa, Marasuttuballi—; *Central Provinces:* Kohoranj—; *Malayalam:* Varavalli—; *Marathi:* Ukshi—; *Mysore:* Marsadaboli—; *Saora:* Kattavedala—; *Tamil:* Minnargodi—; *Telugu:* Adivijama, Bandimurugudu, Gaddaputike, Kalikatige, Kattavedala, Murugudutige, Pippindatige, Tellavadala—; *Uriya:* Dhonoti, Kukundia—.

ANOGEISSUS Wall.

Shrubs or small trees. Leaves alternate, petiolate, entire. Flowers small, yellow, in dense globose axillary heads; peduncles slender. Calyx-tube compressed, 2-winged, attenuated and produced above the ovary; limb campanulate or urceolate, 5-fid, deciduous. Petals 0. Stamens 10, biseriate, exserted; anthers small, cordate. Ovary inferior, 1-celled; ovules 2, pendulous from the top of the cell; style filiform, thickened at the base, villous; stigma simple. Fruit packed in dense heads, small, thickly coriaceous, broadly trapezoidal, 2-winged, terminated by the produced calyx-tube. Seed 1, ovoid; cotyledons convolute.—Species 6.—Tropical Africa and Asia.

A. leiocarpa Guill. & Perr. is used medicinally in Guinea, *A. schimperi* (Hochst.) Hutch. & J. M. Dalziel in the Gold Coast.

1. **Anogeissus latifolia** Wall. Cat. (1828) 4015; Bedd. Fl.

Sylv. t. 15.—*Conocarpus latifolia* Roxb. Hort. Beng. 34; Wight Ic. t. 994.—PLATE 418.

An erect tree sometimes reaching 18-21 m.; bark smooth, light coloured; young parts glabrous or silky-pubescent. Leaves 6.3-10 by 3-5 cm., alternate or subopposite, elliptic or oblong-elliptic, obtuse or very often shortly cuspidate, glabrous when fully grown, pale dull glaucous-green, base usually rounded, midrib prominent, pink; main nerves 6-10 pairs, arching prominent on the lower side, the veins between them reticulate; petioles 6-13 mm. long. Flowers sessile, in small dense heads; peduncles 1 or more from the same axil, branched, not much longer than the petioles. Calyx-tube pubescent; teeth short, broadly triangular. Fruit small, several crowded in a globular head, the nucleus nearly planoconvex, 4-5 mm. long (excluding the beak), 3-4 mm. broad (including the wings), yellowish brown, glabrous or more or less pubescent, winged down the 2 longer sides, beaked with the persistent calyx which is as long as or sometimes longer than the nucleus; wings with entire margins. Seed solitary.

Distribution: Throughout the greater part of India and Ceylon.

The root is pungent, acrid, stomachic, increases biliousness.—The bark is pungent, acrid, sweet, cooling; improves both taste and appetite; causes biliousness; removes "kapha" and "vata"; useful in anæmias, urinary discharges, piles; applied in skin diseases and erysepelas.—The juice of the leaves is given in purulent discharges from the ear.—The fruit is acrid, dry, with flavour; cooling, astringent to bowels; increases "vata"; cures "kapha" and biliousness (Ayurveda).

The bark is bitter, astringent to the bowels; useful in liver complaints, chronic diarrhœa, ophthalmia, and eyesores (Yunani).

Among the Mundas of Chota Nagpur the bark enters into the composition of a remedy against difficult expectoration and obstruction of the windpipe by phlegm.

Sushruta recommends the plant as useful in the treatment of snake-bite and scorpion-sting. The flowers, and the ash of the root, bark and leaves are useless in the antidotal treatment of snake-bite

(Mhaskar and Caius). The flowers are not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Kahti—; *Badaga:* Tirapu—; *Baigas:* Dhawa—; *Banda:* Khardhawa—; *Bengal:* Dhaoya—; *Bhabar:* Bakli—; *Bhil:* Dhaundak—; *Bombay:* Dabria, Dhavada—; *Bundelkhand:* Bakli, Dhao, Dhauri—; *Canarese:* Bejjalu, Dindala, Dindiga, Dindhlu, Dinduga—; *Central Provinces:* Dhaura—; *Deccan:* Dhava—; *English:* Button Tree—; *Gharwal:* Dhaura—; *Gond:* Arma, Yerma—; *Gujerati:* Dabria, Damora, Dhavdo—; *Hindi:* Bakla, Bakli, Bankli, Dhaoya, Dhau, Dhaura, Dhauri, Dhauta, Dhava, Dohu—; *Khond:* Munla—; *Kolami:* Hesel—; *Konkani:* Dindal—; *Kurku:* Dhaura—; *Lambadi:* Dhibedi—; *Malaya:* Dhau—; *Malayalam:* Malakanniram, Marukanniram, Vellanava—; *Marathi:* Daura, Dhamora, Dhauda, Dhavda—; *Mundari:* Heseldaru—; *Oudh:* Dham—; *Persian:* Bakla, Banti—; *Porebunder:* Bhutabakro, Bhutadhavdo—; *Rajputana:* Dau, Dhaukra, Dhokri, Goldia, Golra—; *Reddi:* Vellama—; *Sanskrit:* Baka, Dhava, Dhavala, Dhurandhara, Dridhataru, Gaura, Ghata, Kashaya, Madhuratvacha, Madhuratvaka, Nanditaru, Pandura, Pandutaru, Pishachavriksha, Pitaphala, Shakatakhya, Shushkanga, Shushkavriksha, Sthira—; *Santal:* Hesel—; *Saora:* Sirikatta—; *Sinhalese:* Daawu—; *Tamil:* Namai, Vekkali, Vellanagai, Vellainamai—; *Telugu:* Shirimanu, Sirimanu, Vellama—; *Ulwar:* Dhauk—; *Urdu:* Bakla, Banti—; *Uriya:* Dhou, Dhonda—.

QUISQUALIS Linn.

Climbing shrubs. Leaves opposite, oblong or obovate-acuminate, thinly coriaceous. Flowers large in short axillary or terminal spikes, red. Calyx-tube long, slender; limb 5-lobed. Petals 5. Stamens 10. Ovary 1-celled; ovules 3-4; style filiform, partly adhering to calyx-tube. Stigma capitate. Fruit dry, 5-angled or winged, coriaceous. Seed 1.—Species 5.—Tropics of Old World.

Q. indica Linn. is used medicinally in China, Indo China, Malaya, the Malay Archipelago, and the Philippine Islands; *Q. madagascariensis* Boj. in Madagascar.

1. **Quisqualis indica** Linn. Sp. Pl. ed. II, 556.—Plate 419.

A strong climber. Leaves elliptic-acuminate, base rounded, dark, green, glabrous above, hairy beneath; nerves 6-8 pairs, 7.5-10 cm. long, 3.8 cm. wide; petioles 7.5 mm. long. Spikes axillary and terminal 2.5 mm. long or more, pubescent. Flowers numerous, pendent, 7.5 cm. long, 3.8 cm. wide, at first white, then deep red. Calyx-tube and triangular acute lobes 6.3 cm. long, pubescent. Petals lanceolate, acute, 1.3 cm. long. Fruit ellipsoid, acutely 5-angled, glabrous, brown, 3.2 cm. long.

Distribution: Indigenous in Burma and the Malay Peninsula—Malaya.—Widely cultivated all over India.

In Amboyna, the leaves are given in a compound decoction for flatulent distension of the abdomen. In China, the ripe seeds are roasted, and given in diarrhœa and fever.

A popular anthelmintic among the inhabitants of Tongking and the North of Annam.

In the Moluccas, the seeds have long been held in repute as an anthelmintic. In the Malay Peninsula, they are still given chiefly in the case of lumbrici in children, when four or five seeds, bruised and given with honey or jam are sufficient to expel the worm.

Experiments by De La Paz on the ascarids of the dog *in vitro* and *in vivo* did not give any satisfactory results confirmatory of the anthelmintic properties of the seed (*Trans. 4th Congress* F.E.A.T.M., 1921).

Annam: Cay giun, Cay trum, Cay trung—; *Bombay:* Vilayati-chambeli—; *Burma:* Dawchmaing—; *Chinese:* Shih Chan Tzu, Shui Chun Tzu—; *Deccan:* Rangunkibil—; *English:* Burma Creeper, Chinese Honeysuckle, Rangoon Creeper, Rangoon Jasmine—; *French:* Liane vermifuge—; *Gujerati:* Barmasinivel—; *Hindi:* Rangoonkibel—; *Ilocano:* Tartarao—; *Indo China:* Day giun, Day run, Khua bung, Reng, Su quan tu, Thuoc giun—; *Malay:* Akar pontianak, Akar suloh—; *Malaya:* Belimbing hutan, Sooi Kwan chee—; *Marathi:* Lalchameli, Rangunchavel—; *Marinduque:* Talolon, Tangalon—; *Mauritius:* Liane vermifuge—; *Pampangan:*

Babebabe—; *Porebunder:* Jhumakabel—; *Tagalog:* Niogniogan, Tangolon, Tangulon, Tartoraoc—; *Tamil:* Irangunmalli, Ilengaramalligai—; *Telugu:* Ettaguttilativva, Rangonimalle, Tigeganneru—; *Tongking:* Cay giun—; *Visayan:* Balitadham, Pinones, Tangolon—.

MYRTACEAE.

Erect trees or shrubs, rarely herbs. Leaves usually opposite petiolate, simple, entire, rarely denticulate or crenate, often with an intramarginal nerve and punctate with resinous or pellucid glands; stipules minute and deciduous or 0. Flowers usually regular hermaphrodite or rarely polygamous, axillary, solitary, or in spikes, cymes, corymbs, or heads, naked or with an involucre, often with 2 bracts at the base. Calyx superior or ½-superior, the tube rarely produced beyond the ovary; limb usually 4-5- fid or -partite, persistent or deciduous, valvate or imbricate, often closed in bud. Disk lining the calyx-tube. Petals as many as the calyx-lobes and alternate with them (rarely 0), inserted on the margin of the disk, usually much imbricate in bud, sometimes more or less connate into a deciduous cap. Stamens usually numerous, inserted on the margin or within the margin of the disk, in 1 or several rows; filaments distinct or connate below, or in bundles opposite the petals; anthers 2-celled, usually dehiscing longitudinally. Ovary inferior or ½-inferior, 1-celled, with 1 or more ovules, or more commonly 2-many-celled with many ovules; style simple; stigma small, capitate or peltate. Fruit usually crowned with the calyx-limb, either 1-celled and 1-seeded by arrest, or 2-many-celled with loculicidal dehiscence, or baccate and indehiscent with the cells many-seeded or 1-seeded by arrest. Seeds angular, cylindric or compressed; testa hard or membranous, sometimes winged; albumen 0; embryo straight, curved or spirally twisted; cotyledons short and obtuse, sometimes combined into a mass with the radicle,

very rarely leafy; radicle often thick.—Genera 90. Species 2,800. —Warm countries, chief centres, Australia and tropical America.

A. Leaves opposite, rarely alternate, gland-dotted
- I. Leaves as a rule opposite, penninerved
  - a. Calyx 4-lobed. Ovary 2-celled. Seeds 1 or few .... EUGENIA.
  - b. Calyx 4-5-lobed. Ovary 4- or 5- celled. Seeds several Peduncles 1-flowered .... MYRTUS.
  - c. Calyx 5-lobed. Ovary 2-celled. Seeds several .... PIMENTA.
  - d. Calyx closed in bud, splitting irregularly. Seeds numerous .... PSIDIUM.
- II. Leaves of older plants alternate
  - a. Calyx truncate, the orifice closed in bud by a cap formed of the concrete petals .... EUCALYPTUS.
  - b. Calyx 5-lobed
    - Stamens in 5 bundles opposite the petals, 3-7 longitudinal nerves .... MELALEUCA.

B. Leaves alternate, not gland-dotted
- I. All stamens fertile. Flowers in spikes or racemes .... BARRINGTONIA.
- II. The stamens of the exterior and interior circles without anthers .... CAREYA.

The members are either astringent and tonic or aromatic and stimulant according as tannin or the essential oil predominates. Some of the oils are powerful antiseptics and stimulants.

The essential oils yield such substances as:—(1) hydrocarbons pinene—; (2) alcohols—isoamyl, cineol, geraniol, linalool, myrtenol, terpineol—; (3) aldehydes—benzoic, butyric, cumic, hexoic, valeric, citral, citronellal—; (4) ketones—menthone—; (5) phenols—eugenol—; (6) esters—; (7) alkaloids—jambosine—.

OFFICIAL:—Eucalyptol (Belgium, France, Germany, Italy, Norway, Portugal, Spain, Sweden, Switzerland, United States); eugenol (Belgium, Norway, Sweden, United States).

Bertholletia excelsa Humb., Bonpl., and Kunth (Portugal).

Caryophyllus aromaticus Linn. (Hungary, United States); *C. aromaticus* Linn.=*Eugenia caryophyllata* Thunb. (Portugal).

Eucalyptus spp. (Germany, Great Britain, Norway, Sweden, Turkey, United States); *E. globulus* Labill. (Belgium, France, Germany, Holland, Hungary, Italy, Japan, Portugal, Spain, Sweden, Switzerland, Turkey, United States).

Eugenia aromatica Baill. (Hungary, Japan)=*Caryophyllus aromaticus* Linn. (Great Britain); *E. aromatica* (Linn.) Baill. (Great

Britain); *E. caryophyllata* Thunb. (Austria, Belgium, Denmark, France, Holland, Norway); *E. caryophyllata* Thunb.=*Caryophyllus aromaticus* Linn. (Italy, Spain); *E. Jambolana* Lam.=*Syzygium Jambolanum* DC. (Holland).

Jambosa caryophyllus Niedenzu (Sweden),—(Sprengel) Niedenzu (Germany, Turkey)=*Caryophyllus aromaticus* Linn. (Switzerland),=*Caryophyllus aromaticus* Linn., *Eugenia caryophyllata* Thunb., *E. aromatica* Baill. (Russia).

Melaleuca spp. (Germany, Great Britain, Norway, Turkey); *M. Cajuputi* Roxb.=*M. minor* Smith (Portugal); *M. leucadendron* Linn. (Austria, Great Britain, Holland, Japan, Russia, Spain, United States),—var. *minor Bentham* (Sweden),—var. *minor* Smith and var. *Cajeputi* Roxburg (Spain); *M. minor* Smith (Russia, Switzerland); *M. viridiflora* Goecht. (Spain).

Myrtus communis var. *lusitanica* Linn.=*M. acuta* Mill. (Portugal); *M. Pimenta* Linn.=*Eugenia Pimenta* De Cand. (Portugal).

Psidium Guajava Linn. (Holland).

Myrtus (Tourn.) Linn.

Myrtus differs chiefly from Eugenia in the horseshoe-shaped embryo, small cotyledons and comparatively large hypocotyl. The petals expand. Carpels 2-3 forming a wholly or almost wholly (septa not quite reaching the apex of the ovary) 2-3-celled ovary, with axile placentation.—Species 70.—Tropical and subtropical regions.

M. communis Linn. is used medicinally in Europe, *M. mucronata* Camb. in Brazil.

Official:—The leaves of *M. communis* var. *lusitanica* Linn. (*M. acuta* Mill.), and the fruit of *M. Pimenta* Linn. (*Eugenia Pimenta* De Cand.) in Portugal.

1. **Myrtus communis** Linn. Sp. Pl. (1753) 471.—Plate 417B.

A shrub with small ovate to lanceolate leaves 2.5-3.8 cm. long, very sweet smelling, white flowers about 2 cm. diam., solitary

axillary on slender peduncles succeeded by ellipsoid berries which finally turn black and are crowned by the 4-5-partite calyx.

Distribution: Indigenous from the Mediterranean to N.-W. Himalayas. Often grown in gardens throughout India.

The leaves are laxative; applied topically to relieve pain; smoke beneficial to piles.—The fruit is bitter when unripe, sweet when ripe; tonic to the brain and the heart; diuretic, emmenagogue; enriches the blood; promotes the growth of the hair; cures headache; used in bronchitis and menorrhagia (Yunani).

The myrtle occupies a prominent place in the uritingo of Hippocrates, Pliny, Dioscorides, Galen, and the Arabian uriters. It is credited with the opposite qualities of cold and hot, or astringent and stimulant, the former residing chiefly in the leaves, the latter in the berries.

In Upper India, the leaves are considered useful in cerebral affections, especially epilepsy, also in dyspepsia, and diseases of the stomach and liver. A decoction is employed as a mouth-wash in cases of apthae. The fruit is carminative, and is given in diarrhœa, dysentery, hæmorrhage, internal ulceration and rheumatism.

The essential oil of the leaves has been esteemed in France as a disinfectant and useful antiseptic, also used in the Paris hospitals in certain affections of the respiratory organs and the bladder, and recommended as a local application in rheumatic affections.

In Malta, the powdered leaves are used as an astringent, especially for sores in children.

The leaf is applied to the sting of the scorpion; but, it is not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Habulas—; *Bengal:* Sutrsowa—; *Bori:* Mara—; *Catalan:* Murta, Murtra—; *English:* Myrtle—; *Eritrea:* Adess—; *French:* Herbe du lagui, Meurthe, Myrte, Myrthe—; *German:* Myrte—; *Greek:* Myrsini—; *Hebrew:* Hodem—; *Hindi:* Murad, Vilayatimehndi—; *Hungarian:* Mirtus—; *Italian:* Mirto, Mortella—; *Malta:* Myrtle, Mirto, Rihan—; *Persian:* As, Asbiri, Isferem, Ismar, Maurid, Tukhamemurid—; *Portuguese:* Murta, Murta ordinaria, Myrto—; *Punjab:* Murad, Vilayatimehndi—;

Roumanian: Mirt—; *Russian:* Myrt—; *Sanjawi:* Mara—; *Spanish:* Arrayan, Mirto—; *Tamil:* Kulinaval, Sadevam—; *Urdu:* Habulas—.

MELALEUCA Linn.

Trees (or shrub). Leaves alternate, lanceolate (or linear), coriaceous. Flowers in spikes (or heads) 5-merous. Calyx-tube subglobose, lobes 5. Petals 5, white. Stamens very numerous, long. Ovary ½-inferior, style slender. Capsule dehiscing by 3 valves. Seeds numerous, minute, cuneate.—Species 130.—All Australian, except one in the Malay Peninsula and Malay Islands.

M. leucadendron Linn. is used medicinally in Indo China, the Malay Archipelago, New Caledonia, Australia, and South Africa.

OFFICIAL:—The oil from the leaves of *Melaleuca spp.* (Germany, Great Britain, Norway, Turkey); *M. Cajuputi* Roxb.=M. *minor* Smith (Portugal); *M. leucadendron* Linn. (Austria, Great Britain, Holland, Japan, Russia, Spain, United States),—var. *minor* Bentham (Sweden),—var. *minor* Smith and var. *Cajeputi* Roxburg (Spain); *M. minor* Smith (Russia, Switzerland); *M. viridiflora* Goecht (Spain).

1. **Melaleuca leucadendron** Linn. Mantiss. 105.—PLATE 420.

A tree about 15 m. tall, 0.6 m. through. Bark papery whitish, peeling off in layers, 2.5 cm. or more thick. Leaves oblong-elliptic, acuminate, subacute; nerves vertical, 5-7, glabrous (except when young), 3.8-12.5 cm. long, 5-25 mm. wide (largest on young shoots); petioles short. Spikes 5-15 cm. long, flowers in whorls, numerous; rhachis silky. (The spike is really the end of a branch with axillary flowers, the leaves suppressed. It continues to grow and become leafy and branch after the fall of the perianth). Fruit sessile, 4 mm. across, cylindric, short.

Distribution: Malay Peninsula, Mergui, Cambodia, Borneo, Amboina.—Sometimes planted in Indian gardens.

The oil is used internally, and also as an external application in rheumatism. It is stimulant and antispasmodic in choleraic diarrhœa. It is prescribed in chronic pityriasis, psoriasis, eczema,

and acne. It is an excellent mosquito repellent; it has the advantage over oil of citronella of volatilising more slowly.

The bark is much esteemed by Sinhalese "native-doctors" as a stimulant and tonic.

The essential oil from the leaves is a powerful stimulant and analgesic. In Indo China, it is rubbed over the skin in rheumatic pains and severe forms of fever. In New Caledonia, it is prescribed as a stomachic and antiseptic. In South Africa, it is used as ear-drops to relieve headache.

Oil of cajuput cannot be recommended as an anthelmintic (Caius and Mhaskar).

Australia: Tea Tree—; *Bengal:* Cajuputte—; *Bombay:* Kayaputi—; *English:* Bottle Brush, Cajeput oil Tree—; *French:* Bois blanc, Cajaput, Cajeput, Cajeputier—; *Hindi:* Kayaputi—; *Indo China:* Cham, Da ra bo dich, Smach chanlos, Tram—; *Malay:* Cajuputi, Daunkitjil, Gelam, Kajukilau, Kayuputia—; *Marathi:* Cajuputa—; *New Caledonia:* Itahou, Meu, M'Me, Niaouli, Yeon nadi—; *Patna:* Ilachie—; *Sinhalese:* Lothsumbul—; *South Africa:* Cajuput Tree, Punk Tree, Swamp Tea Tree—; *Tamil:* Kaiyappudai—.

Eucalyptus L'Herit.

Evergreen trees or shrubs, usually glabrous, often reaching a gigantic size usually secreting aromatic resinous gum. Leaves usually alternate, mostly vertical, more or less falcate, glanddotted, generally thick, penniveined, always with an intramarginal vein. In seedlings the leaves are usually opposite and generally differently shaped from those of mature plants. Flowers ebracteate, usually white, in simple or paniculate umbels, bisexual. Calyx-tube adnate to the ovary and often produced beyond it. Orifice of the calyx-tube closed in bud by a cap which falls off when the stamens expand. Stamens numerous, in many rows, mostly free, usually inflexed in bud. Ovary inferior, 3-6-celled; ovules numerous, axile; style undivided. Fruit a capsule opening at the top by 3-6 valves, usually hard and woody. Seeds numerous, minute or rather small, compara-

tively few fertile, these being somewhat larger than the abortive ones. —Species 230.—Almost all Australian.

1. Leaves 15-20 cm. long .... 1. *E. citriodora.*
2. Leaves 20-25 cm. long .... 2. *E. globulus.*

Eucalyptus Oil is distilled from the leaves of numerous species.

The oil is an antiseptic; a popular prophylactic, inhaled or sprayed, for influenza and bronchial catarrh. Mixed with an equal quantity of oilve oil it is considered a useful rubefacient for rheumatism. It has been used as an anthelmintic in ankylostomiasis mostly in combination with chloroform.

The bark of *E. resinifera* Smith (Australia) is extremely astringent.

OFFICIAL:—The leaves of *E. globulus* Labill. (Belgium, France, Germany, Holland, Hungary, Italy, Japan, Portugal, Spain, Sweden, Switzerland, Turkey, United States); the oil from the leaves of various species (Germany, Great Britain, Norway, Sweden, Turkey, United States).

1. **Eucalyptus citriodora** Hook. in Mitch. Journ. Trop. Australia (1848) 235.

A tall tree with slender erect stem and smooth bark. Leaves 15-20 cm. long, lanceolate, usually falcate, bright green when crushed with an exquisite lemon scent, those of seedlings hairy, attached peltately to the petiole, lanceolate, horizontal. Flowers in usually 3-flowered umbels arranged in panicles on short leafless branches. Operculum hemispheric, abruptly shortly pointed. Stamens opening by slits. Fruits rather large, 1.3 cm. long by 1 cm. diam., ovoid-urceolate, valves deeply enclosed.

Distribution: Queensland.—Cultivated in many parts of India.

The oil is quite ineffective as an anthelmintic (Caius and Mhaskar).

Telugu: Talanoppi—.

2. **Eucalyptus globulus** Labill Voy. I (1799) 153, t. 13.

A gigantic tree, bark smooth peeling off in long strips which often remain hanging on the stem or branches. Leaves 20-25 cm.

long, falcate, curved, rather thick, those of seedlings sessile, opposite, horizontal, broadly ovate, very glaucous, with a bluish hue. Flowers large, axillary, 1-3 together, nearly sessile. Operculum thick, warty, low, abruptly pointed. Anthers opening by slits. Fruits 1.8-2.5 cm. diam., warty, angular, valves exserted.

Distribution: Australia.—Cultivated in India.

The leaves yield a strong pungent essential oil, valued in medicine as an antiseptic, febrifuge, and anthelmintic.

In South Africa, an infusion of the leaf is used as a spray for vermin-infested places, and is said to dislodge them effectively. Steam from water in which the leaves are boiling is inhaled as a respiratory antiseptic. Among the very poor, both European and Native, the finely powdered bark is employed as a dusting powder. The root is considered purgative.

In the Transvaal, Europeans apply a poultice of the bruised leaves to draw abscesses to a head.

Afrikaans: Bloekom, Blougom—; *Canarese:* Taila—; *English:* Blue Gum—; *French:* Arbre ă la fievre, Bois de gommier blue, Gommier bleu de Tasmanie—; *Hova:* Bilogoma—; *Tamil:* Karupuramaram—.

Psidium Linn.

Trees or shrubs. Leaves opposite, entire, not dotted. Peduncles 1-few-flowered; flowers large, white. Calyx urceolate or obovate; limb undivided in aestivation, separating valvately into 4-5 lobes when in flower. Petals 4 or 5, free. Stamens many. Ovary 2- or more- celled with many ovules in each cell. Berry many-seeded. Seeds with hard testa; embryo curved, radicle long, cotyledons short. —Species 110.—Tropical America, W. Indies.

The fruit is mucilaginous and astringent.

The following species are used medicinally in Indo China, the Malay Archipelago, the Philippine Islands, Madagascar, and the Gold Coast—*P. guyava* Linn.—; in South America—*P. guyava* Raddi, *P. salutare* Berg.—; in Brazil—*P. albidum* Camb., *P. acutangulum*

DC., *P. araca* Raddi, *P. cattleyanum* Sabine, *P. guyava* Raddi, *P. incanescens* Mart., *P. pubescens* Mart.—.

OFFICIAL:—The leaves of *P. Guyava* Linn. (Holland).

1. **Psidium guyava** Linn. Sp. Pl. (1753) 470.—PLATE 421.

A large evergreen or subdeciduous shrub, sometimes a small tree up to 90 cm. girth and 7.5 m. high. Stem irregularly fluted when old. Bark quite smooth, pale pinkish brown or buff with grey patches, exfoliating in very thin woody plates. Blaze 2.5-5 mm., cheesy, not fibrous, whitish or pinkish brown usually tinged with chlorophyl outside, the juice turning purple on the blade of a knife. Leaves 10-15 cm. long, oblong or elliptic-oblong, entire, glabrous above, pubescent beneath, pellucid-punctate, lateral nerves 10-20 pairs, prominent beneath, strongly curved near the edge and joined by intramarginal veins. Petioles 2.5-7.5 mm. long. Flowers 2.5-3.8 cm. diam., white. Peduncles 1.3-3.8 cm. long, axillary, 1-3-flowered. Calyx-tube adnate to the ovary and produced above it, the upper free portion entire, closed in bud at length bursting irregularly into lobes. Fruit a globose or pyriform berry 5 cm. long or more.

Distribution: A native of Mexico and possibly of other parts of tropical America; cultivated and naturalized throughout India and most tropical countries.

Forma *pyrifera* Blatter.—*Psidium pyriferum* Linn. Sp. Pl. ed. II, 672.—Fruit obovate.

Forma *pomifera* Blatter.—*Psidium pomiferum* Linn. Sp. Pl. ed. II, 672.—Fruit globose.

The fruit is acrid and sour, with a flavour; cooling, aphrodisiac; causes "kapha"; cures "vata", "tridosha", and biliousness (Ayurveda).

The leaves are used for wounds and ulcers, and as an astringent for bowels.—The flower cools the body; used in bronchitis; applied to sore eyes.—The anthers dry wounds; cool the heated brain.—The fruit is sweet or sour; tonic, cooling, laxative after food; used in thirst, heat of the body; good in colic, and for bleeding gums.—The gum is tonic; the ash caustic (Yunani).

The bark of the root of var. *pyriferum* is valued for its astringent properties, and has been employed with success in the diarrhœa of

children. It is generally administered in the form of a decoction. The decoction serves a good deal in the prolapsus ani of children. The young leaves are used as a tonic in the diseases of the digestive functions. The bark of the var. *pomiferum* possesses similar properties. The decoction of the leaves has been used in cholera with some success, in arresting vomiting and diarrhœa.

The leaves when chewed are said to be a remedy in toothache.

In the Gold Coast, the roots are beaten and mixed with water and used in curing diarrhœa and dysentery. The leaves are said to relieve toothache when chewed.

In Guiana, the roots, the leaves, and the buds are considered astringent and antidysenteric; an infusion of the roots and leaves is a popular astringent drink.

A decoction of the young leaves and shoots is prescribed in the West Indies in febrifuge and antispasmodic baths; an infusion of the leaves in cerebral affections, nephritis, and cachexia; the pounded leaves are locally applied in rheumatism; an extract is used in epilepsy and chorea; the tincture is rubbed into the spine of children suffering from convulsions. The fruit and its conserve are astringent and suitable to those suffering from diarrhœa and dysentery.

The leaves (*Journ. Chem. Soc.*, 1905) and the oil they yield (Schimmel, April, 1910) have been examined chemically.

Antilles: Goyavier, Goyavier de Cayenne, Goyavier commun, Goyavier de jardin, Goyavier du pays, Poirier des Indes—; *Arabic:* Amrud, Judakaneh, Kamsharni—; *Assam:* Madhuriam, Muhuriam—; *Badaga:* Pera—; *Bengal:* Goaachhi, Peyara, Piyara—; *Betsimisaraka:* Gavo—; *Bombay:* Jam, Perala, Peru—; *Brazil:* Arasaguasu, Guaiaba—; *Burma:* Malaka, Malakaben—; *Cambodia:* Trabek srok—; *Canarese:* Gova, Jamaphala, Perala, Sibi—; *Cochin China:* Gay oi, Oi rung nho, Poirier des Indes—; *Deccan:* Guava, Jam, Laljam, Safedjam—; *Dukhni:* Jam—; *Dutch India:* Djamboe bidji, Djamboe kloetoek—; *English:* Guava Tree—; *Ewe:* Goa—; *Fanti:* Eguaba—; *French:* Araca, Aracaïba, Coyavier, Goyavier—; *Ga:* Goa—; *Guiana:* Goyavier savane—; *Gujerati:* Jamrud, Jamrukh,

Peru, Piyara—; *Hindi:* Am, Amrud, Amrut, Safedsafari—; *Hova:* Goavifotsy, Goavimena, Goavy—; *Indo China:* Oi, Phan thach luu, Sida, Trabek—; *Konkani:* Per—; *Krobo:* Goa—; *Kumaon:* Amrud—; *La Reunion:* Gouyavier—; *Lepcha:* Amlorkung—; *Mach:* Amrut—; *Magahi:* Gaya—; *Malayalam:* Koyya, Malakkapera, Pera—; *Marathi:* Jamba, Tupkel—; *Mexico:* Guayaba, Guayabo—; *Nepal:* Ambak, Amuk—; *North-Western Provinces:* Amrud, Piyara—; *Nzima:* Aduaba—; *Persian:* Amrud—; *Portuguese:* Goiaveira, Goyabeira, Pereira—; *Punjab:* Anjirzard, Amrud, Amrut—; *Rajputana:* Amrut—; *Rindli:* Amrut—; *Sanskrit:* Aprithaktvacha, Dridhabija, Madhuramla, Mansala, Mridu, Perala, Peruka, Pita, Tuvara, Vastula—; *Saora:* Kondajami—; *Sind:* Zaitun—; *Sinhalese:* Pera, Peragadi—; *Spanish:* Guayabas, Guyaba, Guyabas—; *Tagalog:* Arrayan, Bayabas, Calinbaquin, Taybas—; *Tahiti:* Tuava—; *Tamil:* Koyya, Segappugoyya, Sengoyya, Sirugoyya, Vellaikoyya, Uyyakkondan—; *Telugu:* Ettajama, Gova, Goyya, Jama, Tellajama—; *Twi:* Gua—; *Urdu:* Amrud—; *Uriya:* Bodojamo, Jamo, Julabojamo, Pidudi—.

EUGENIA Mich. ex Linn.

Evergreen trees or shrubs. Leaves opposite, penninerved, glanddotted, exstipulate. Flowers in terminal or axillary paniculate cymes, or solitary in the axils of the leaves or of scales below the leaves, often on suppressed branchlets, appearing to be fasciculate or racemose; bracts usually small and deciduous. Calyx-tube globose, ovoid, turbinate, or elongate, not or more or less produced above the ovary; segments of the limb 4 (rarely 5), or the limb subtruncate. Petals 4 (rarely 5 or more or 0), free and spreading, or more or less connate into a calyptra which falls of on the expansion of the flower. Stamens many, in many rows, distinct or slightly combined into 4 bundles; filaments filiform; anthers small, versatile, dehiscing longitudinally. Ovary inferior, 2- (rarely 3-) celled; ovules many in each cell; style filiform; stigma small. Fruit usually a juicy berry (rarely dry), crowned with the remains of the calyx. Seeds few, globose or ellipsoid; albumen 0 or very scanty; embryo

thick, fleshy; radicle short; cotyledons thick, more or less connate or distinct.—Species 750.—Warm countries.

A. Flowers showy, usually 4-merous. Seeds large with a thick fleshy endocarp	1. *E. jambos.*
B. Calyx-tube hemispherical	5. *E. hemispherica.*
C. Calyx elongate. Flowers in terminal and axillary corymbs. Calyx shorter	4. *E. spicata.*
D. Petals united. Leaves opposite	
1. Leaves broadly ovate or elliptic-rounded at the apex or obtusely acuminate, nerves few, distant	2. *E. operculata.*
2. Leaves ovate or oblong-obtuse or more or less acuminate, closely nerved	3. *E. jambolana.*

The fruit and the bark are mild astringents.

The following species are used medicinally in China—*E. caryophyllata* Willd.—; in Indo China—*E. caryophyllata* Willd., *E. jambolana* Lam., *E. jambos* Linn., *E. malaccensis* DC., *E. operculata* Roxb., *E. zeylanica* Wight—; in the Philippine Islands—*E. jambolana* Lam.—; in Brazil—*E. brasiliensis* Lam., *E. depauperata* Camb., *E. dysenterica* DC., *E. edulis* Benth. & Hook. fil., *E. jambos* Linn., *E. myrobalana* DC., *E. myrtifolia* Camb., *E. pseudocaryophyllus* DC., *E. uniflora* Linn., *E. uvalha* Camb., *E. variabilis* Baill., *E. vellozianum* Berg.—; in Chili—*E. chegen* Molina—; in the West Indies—*E. acris* W. & Arn.—; in Guiana—*E. caryophyllata* Willd., *E. Jambos* Linn., *E. latifolia* Aublet, *E. uniflora* Linn.—; in La Reunion—*E. cotinifolia* Jacq.—; in Madagascar—*E. cuneifolia* Bak., *E. Parkerii* Bak.—; in South Africa—*E. gerrardi* Sim.—.

OFFICIAL:—The dried flower buds of *E. aromatica* (Linn.) Baill (Great Britain),—Baill. (Hungary, Japan)=*Caryophyllus aromaticus* Linn. (Great Britain); *E. caryophyllata* Thunb. (Austria, Belgium, Denmark, France, Holland, Norway)=*Caryophyllus aromaticus* Linn. (Italy, Spain).

The bark of *E. Jambolana* Lam.=*Syzygium Jambolanum* DC. (Holland).

1. **Eugenia jambos** Linn. Sp. Pl. (1753) 470.—*Jambosa vulgaris* DC. Prodr. III, 286.—PLATE 422.

A small tree with lanceolate leaves 12.5-20 cm. long narrowed into a short petiole, secondary nerves rather distant joined by a

prominent looping intramarginal one. Easily recognised by its very large handsome flowers about 7.5-10 cm. diam. (with the long stamens) and which are in short terminal racemose cymes with pairs of flowers (trichotomous cymes with the central axis not at once terminating in a flower). Sepals rounded. Fruit globose, white, 2.5-5 cm., with 1-2 grey seeds loose in the large cavity of the succulent pericarp.

Distribution: Sikkim Terai.—Yunnan to Australia. Cultivated in many places.

The bark is sweet, acrid; hot; astringent to the bowels; improves the voice; used in asthma, thirst, fatigue, dysentery, heavy speech, bronchitis.—The fruit is sweet and tasty; indigestible astringent to the bowels; removes "tridosha" (Ayurveda).

The fruit is sweet with a flavour; indigestible, tonic to the brain; used in liver complaints.—The seeds are astringent to the bowels; used in syphilis (Yunani).

In Bhamo, Upper Burma, the leaves are boiled and used for sore eyes.

In Indo China, the bark is considered a good astringent; every part of the plant is digestive, stimulant, antiodontalgic. In Cambodia, the water in which the leaves have macerated is used in fevers.

Arabic: Toffah—; *Bengal:* Gulabjamb, Jamrul—; *Betsimisaraka:* Varotra—; *Bombay:* Gulabjaman, Sakarajambha—; *Burma:* Thabye—; *Cambodia:* Chompuh sa—; *Canarese:* Jamba, Jambu, Jambunerale, Pannerali, Punnerl—; *Ceylon:* Seenijambu—; *Coorg:* Mallenerale, Pennerale—; *Deccan:* Jamb—; *English:* Malay Apple, Rose Apple—; *French:* Jamberosade, Jambose, Jambosier, Jamerosade, Jamerose, Jamerosier, Jamrosade, Jamrose, Pommier rose, Prune de Malabar—; *French Guiana:* Pomme rose—; *Hindi:* Gulabjaman—; *Hova:* Jambarao, Vasebambazaha, Zahamborozano, Zama, Zamborao—; *Ilocano:* Barabag, Baracbac—; *Indo China:* Bo dao, Chom pu, Dao Anna, Dao tien, Dieu do, Do, Gioi, Mak chieng—; *Konkani:* Zambo—; *La Reunion:* Jambrosade, Jamrosa—; *Malay:* Jambu mawar—; *Malayalam:* Champa, Jambavam, Jambu, Malakkachampa—; *Mexico:* Poma rosa—; *Mundari:* Kuda, Kudadaru, Pundikuda—; *Pampangan:* Balo-

bac—; *Philippines:* Mamana rosa—; *Portuguese:* Jambo—; *Sanskrit:* Brihatphala, Jambu, Jamburaja, Kokileshta, Mahajambu, Mahanila, Mahapatra, Mahaphala, Nanda, Phalendra, Rajajambu, Shukapriya, Surabhipatra, Svarnamata—; *Seychelles:* Iamrosa—; *Sind:* Jamu—; *Sinhalese:* Jambu, Velijambu—; *Tagalog:* Balacbac, Calobcob, Macupa, Tampoi, Yambo—; *Tamil:* Perunaval, Sambunagai, Sambunaval—; *Telugu:* Jambuneredu, Peddaneredu—; *Tulu:* Jambunerolu—; *Urdu:* Gulabjaman—; *Uriya:* Golabjamu, Jombu, Simajamc—; *Visayan:* Tampoi—.

2. **Eugenia operculata** Roxb. Hort. Beng. (1814) 37; Fl. Ind. II (1832) 486.—*E. cerasoides* Roxb. ll. cc. 92 et 488; Wight Ic. t. 615.—Plate 423 and Plate 425 (under *E. cerasoides* Roxb.).

A small or medium sized tree up to 2 m. girth and 18 m. high. Bark pale brown, slightly rough, exfoliating in irregular woody plates. Blaze 2-2.8 cm., soft, very fibrous, but fibers short, pinkish brown, often pale, the juice turning purple on the blade of a knife. Twigs smooth, green, more or less compressed. Leaves 11.5-25 7-11.5 cm., broadly elliptic or obovate, apex rounded or with a short obtuse acumen, base rounded or cuneate, entire, glabrous, rather thick, with 8-13 pairs of arcuate secondary nerves, dull green above and below. Petiole 1.3-3.3 cm. long. Flowers about 7.5 mm. across, white, sessile, ternate, in trichotomous panicles 5-12.5 cm. long, mostly from old leaf-scars. Petals united to form a calyptra. Berry 7.5-10 mm. long, globose or ellipsoid with truncated concave tip.

Distribution: Sub-Himalayan tract from the Jumna eastwards, common in savannahs in Sal forests, Bihar, Orissa, Assam, Sylhet, Cachar, Chittagong, Upper and Lower Burma, Malay Peninsula.

The bark is acrid, bitter; refrigerant, heavy, tonic, astringent to the bowels, aphrodisiac; given in dysentery, diseases of the blood, bronchitis, biliousness, ulcers (Ayurveda).

In Chota Nagpur, the fruit is eaten for rheumatism; the root, boiled down to the consistence of a syrup, is applied to the joints by rubbing; the leaves are much used in dry fomentation; the bark is also employed medicinally.

In Tongking, the leaves are used as a substitute for tea, the flowers as a substitute for the leaves of eucalyptus.

Bhabar: Piaman, Raijaman—; *Burma:* Konthabye, Teathabyay, Thabyaychin, Yethabyay—; *Cagayan:* Barong—; *Chittagong:* Boteejam—; *Dehra Dun:* Piaman, Thuti—; *Garhwal:* Paiman—; *Hindi:* Dugdugia, Jamawa, Paiman, Piaman, Raijaman—; *Indo China:* Voi—; *Khond:* Panapoki—; *Kolami:* Topa—; *Malayalam:* Naral—; *Mundari:* Kuda, Kudadaru, Topakuda—; *Sanskrit:* Bhramareshta, Bhringavallabha, Bhumijambu, Jalajambuka, Kashtajambu, Pikabhaksha, Rhasva, Rhasvaphala, Sukshmapatra—; *Santal:* Totonopak—; *Sinhalese:* Batatdomba, Kobomal—; *Tagalog:* Malaruhak—; *Uriya:* Monisiajamo—.

3. **Eugenia jambolana** Lam. Encycl. Méth. III (1789) 198; Wight Ic. t. 535; Bedd. Fl. Sylv. t. 197.—*E. caryophyllifolia* Lam; Wight Ic. t. 553.—Plate 424.

A large evergreen glabrous tree up to 3.6 m. girth and 30 m. high. Bark pale brown, slightly rough on old stems with shallow cracks and depressions exfoliating in woody scales. Blaze 3.8 cm., fibrous, red or pinkish brown, the juice turning purplish black on the blade of a knife. Leaves very variable, usually 7.5-15 by 3.8-6.3 cm. lanceolate elliptic-oblong or broadly ovate-elliptic, acute, acuminate or subobtuse, coriaceous, smooth and shining above, with numerous close parallel fine secondary nerves uniting to form an intramarginal vein. Petiole 8-25 mm. long, channelled. Flowers 7.5-13 mm. across, whitish, fragrant, sessile, arranged mostly in threes in trichotomous panicles 3.8-10 cm. long which usually appear from the scars of fallen leaves, but sometimes in the leaf-axils. Calyx-tube 2.5-5 mm. long, turbinate; limb truncate, or obscurely 4-lobed. Petals united into a thin membranous calyptra. Fruit variable in size up to 2.5 cm. long, ellipsoid or oblong, crowned with the truncate calyx-limb, black with pink juicy pulp.

Distribution: Throughout India, Ceylon,—Malaya, Australia. Very often planted.

The bark is acrid, and sweet; digestive, astringent to the bowels, anthelmintic; good for sore throat, bronchitis, asthma, thirst, bilious-

ness, dysentery, blood impurities, ulcers.—The fruit is acrid and sweet; cooling, dry, astringent to the bowels; increases "vata"; removes bad smell from the mouth, and biliousness. The seed is sweet; astringent to the bowels; good for diabetes.—The sprouts are refrigerant, dry, astringent to the bowels, carminative (Ayurveda).

The ash of the leaves is used for strengthening the teeth and the gums.—The fruit is sour, acrid, sweet; a general tonic; tonic to the liver, enriches the blood; strengthens the teeth and the gums; useful astringent in bilious diarrhœa; good gargle for sore throat; good lotion for ringworm in the head.—The vinegar from the fruit is tonic, astringent, carminative; useful in diseases of the spleen.—The seed is astringent, diuretic; stops urinary discharges (Yunani).

The bark is astringent, and is used alone or in combination with other medicines of its class, in the preparation of astringent decoctions, gargles and washes. The fresh juice of the bark is given with goat's milk in the diarrhœa of children. The expressed juice of the leaves is used alone or in combination with other astringents in dysentery.

A vinegar, prepared from the juice of the ripe fruit, is an agreeable stomachic and carminative; it is also used as a diuretic.

Recently the seeds have been used in diabetes.

In Las Bela, the bark, reduced to ashes and mixed with oil, is used for burns (Hughes-Buller).

Several mild cases of dysentery were cured by the administration of the decoction of the bark; but in acute and severe cases more powerful remedies had to be substituted (Koman).

The seeds have been examined chemically (*Journ. Chem. Ind.*; 1912, 1913).

Assam: Jamu—; *Badaga:* Nerale, Neralu—; *Bengal:* Chotajam, Jam, Kalajam—; *Bombay:* Jambhul, Jambu, Jambudo, Jambul—; *Burma:* Thabyebyu—; *Canarese:* Jambunerale, Nayinerale, Nerale, Neralu, Nerilu—; *Central Provinces:* Jamin, Jamul, Jamun—; *Dutch East-India:* Djamblang—; *English:* Black Plum, Jambol, Jambul, Java Plum—; *French:* Jambol, Jambul, Jamlongue—; *Garhwal:* Phalinda—; *Garo:* Chambu—; *Gond:* Naindi—; *Gujarat:* Jambu, Jambudi, Jambura, Jamli, Rajambu, Ravanam—; *Hasada:* Hamta-

kuda—; *Hindi:* Bahojaman, Jam, Jaman, Jamun, Jamniphalani, Kalajaman, Pairman, Phalanda, Phalinda, Pharenda, Phaunda—; *Hova:* Rotravazaha—; *Ilocano:* Lumboi—; *Indo China:* Pring bai, Pring das krebey, Tram ba vo, Voi rung—; *Khond:* Lohudru—; *Kolami:* Jamun, Kuda—; *Konkani:* Jambol, Jambul, Zambol—; *Kumaon:* Jaman, Phalenda—; *Lambadi:* Nankojamburo—; *Lepcha:* Phoberkung—; *Magahi:* Chakukau, Zebri—; *Malay:* Jam, Jambelan, Jiwat, Salam—; *Malayalam:* Naga, Naval, Perinnaral—; *Marathi:* Jam, Jaman, Jambul, Rajale, Rajjambula, Thorajambula—; *Michi:* Korjam—; *Mundari:* Dinkikudadaru—; *Mysore:* Nerale—; *Naguri:* Dinkikuda—; *Nasirabad:* Jamun—; *Nepal:* Kalajam—; *Pampangan:* Duat, Duhat, Lumboi—; *Porebunder:* Jambu, Rayajambu—; *Portuguese:* Jamboleiro, Jamboloeiro—; *Rajputana:* Jamun—; *Reddi:* Neredu—; *Sanskrit:* Brahaspati, Jambavam, Jambu, Jambula, Kakajambu, Mahaskandha, Meghamodini, Meghavarna, Nilaphala, Rajphala, Rajasha, Shukapriya, Shyamala, Surabhipriya, Svetajambu—; *Santal:* Birkod, Chudukbad, Kud, Kudu, Sokod—; *Saora:* Neredu—; *Sinhalese:* Madan, Mahadan—; *Tagalog:* Duat, Duhat, Lomboi, Lumboi—; *Tamil:* Arugadam, Kottainagam, Kottainaval, Nagai, Naval, Neredam, Sambal, Sambavi, Sambu Takkolam—; *Telugu:* Jambuvu, Neredu, Peddaneredu, Rasaneredu—; *Tulu:* Nerolu—; *Uraon:* Jambun—; *Urdu:* Jaman, Phalenda—; *Uriya:* Bhotojamo, Chuajamo, Jamo, Kutijamo—; *Visayan:* Duat, Duhat, Lumboi—.

4. **Eugenia spicata** Lam. Encyc. Méthod. III (1789) 201.—*E. zeylanica* Wight Ill. II (1850) 15.

A large shrub or small tree, very handsome when in full flower; bark pale-brown; branchlets slender, obsoletely 4-angled or terete, purplish brown, shining. Leaves aromatically fragrant when bruised, coriaceous, variable, 3.8-10 by 1-3.8 cm., ovate-elliptic to linear-lanceolate, usually caudate-acuminate, smooth and shining on both surfaces, paler and minutely glandular beneath, the margins slightly recurved, base acute; main nerves numerous, inconspicuous, uniting into an inconspicuous intramarginal nerve near the edge; petioles 2.5-6 mm. long. Flowers white conspicuous, in axillary and terminal

many-flowered paniculate cymes, in clusters of 3-5 at the ends of the ultimate cyme-branches. Calyx funnel-shaped, 5 mm. long, tubercled with glands on the outside, sessile or nearly so; lobes 4-5, broadly ovate or rotundate, concave, erect. Petals 4-5, orbicular, usually calyptrate but sometimes imperfectly so. Fruit pisiform, less than 6 mm. diam., pure white, 1-seeded.

Distribution: W. Peninsula, Orissa, Sylhet, Ceylon.—Malaya, Sumatra, Borneo.

In Indo China, the plant is held in great repute as a stimulant, antirheumatic, and antisyphilitic.

Burma: Thabyepauk—; *Canarese:* Guddapanneralu, Kunnerale, Nerkal—; *Indo China:* Jambosier de Ceylan, Pring chanh, Pring lien, Sim rung nho, Smach daum, Sme smach, Tram sang—; *Malayalam:* Nyara, Puvala, Veluttanaral—; *Marathi:* Bhedas—; *Sinhalese:* Maran, Maranda—; *Tamil:* Marungi—; *Tulu:* Jogiparndu—; *Uriya:* Sagarabatna—.

5. **Eugenia hemispherica** Wight Ill. II, 14; Ic. t. 525.

A medium sized tree, with smooth, yellowish grey bark; young twigs subtetragonal. Leaves 9-12.5 cm., lanceolate, tapering to base, caudate-acuminate, subacute, stiff, smooth and shining, petiole about 13 mm., slender. Cymes terminal and axillary, shorter than the leaves; flowers large, 3.2 cm.; pedicels long, articulated below the flowers, buds large, broad; calyx-tube short, 6-10 mm., hemispherical; segments large, rounded, white, with membranous margins, spreading; petals large, rounded, very concave, reflexed. Fruit globose, 2-2.5 cm., green, crowned with calyx-segments.

Distribution: W. Peninsula, Ceylon, up to 4,000 ft.

A decoction of the bark is used in biliousness and syphilis.

Canarese: Banenerale, Makkinerale, Mattanerale, Nayineralu—; *Coorg:* Makkinerale—; *Malayalam:* Payanaval, Vellanaral, Vennaral—; *Tamil:* Vellainaval—.

PIMENTA Lindl.

Leaves large, leathery, feather-veined, long-stalked, blackdotted beneath. Flowers numerous, small, white; borne in terminal or

axillary, trichotomous cymes; calyx-tube top-shaped; petals 4-5; stamens numerous. Drupe 1-2-seeded. Species 5.—Tropical America, W. Indies.

The genus exhibits aromatic, stomachic, and carminative properties.

1. **Pimenta acris** Kostel Allg. Med. Pharm. Fl. IV, 1526.—*Eugenia acris* Wight & Arn. Prod. 331; Wight Ill. II (1850) 13, 18.

A shrub or small tree, bark separating in shreds or plates. Leaves shining above, very aromatic. Flowers quinary. Ovary 2-celled with several ovules in each cell attached round the edge of a broad free placenta. Embryo spirally involute.

Distribution: W. Indies.

The powdered fruit is used in flatulence, dyspepsia, and diarrhœa.

Canarese: Gandamenasu, Malayalamunji, Maramenasa—; *La Reunion:* Quatre epices—; *Malayalam:* Chinamulaku, Kappalmulaku—; *Tamil:* Kattukkaruva—.

BARRINGTONIA.

Trees. Leaves alternate, crowded towards the ends of the branches, usually membranous, penninerved, not gland-dotted. Flowers in terminal and lateral racemes or interrupted spikes; bracts small, very caducous; bracteoles minute or 0. Calyx-tube ovoid or turbinate, not or scarcely produced above the ovary; lobes 2-4 (rarely 5). Petals 4 (rarely 5), imbricate, adnate at the base to the staminal tube. Stamens numerous, in several rows, connate at the base into a ring or very short cup; filaments filiform, all antheriferous; anthers small. Disk annular, at the top of the ovary between the stamens. Ovary inferior, 2-4-celled; ovules 2-8 in each cell, pendulous or horizontal; style long, filiform; stigma small. Fruit fibrous or leathery, globose, ellipsoid, or quadrangular, crowned with the calyx-limb, usually 1-seeded. Seed ovoid or ellipsoid, exalbuminous; embryo thick, fleshy, consisting of 2 concentric homogeneous layers; cotyledons rudimentary, scale-like.—Species 30.—Palaeotropics.

1.	Leaves crenate-denticulate	1.	*B. racemosa.*
2.	Leaves entire	3.	*B. speciosa.*
3.	Leaves cuneate-elliptic. Fruit quadrangular-oblong	2.	*B. acutangula.*

B. racemosa Blume is used medicinally in Indo China and in Madagascar; *B. acutangula* Gaertn. and *B. butonica* Forst. in Indo China. *B. montrouzieri* Vieill. and *B. speciosa* Linn. are used as fish poisons in New Caledonia.

1. **Barringtonia racemosa** Roxb. Hort. Beng. (1814) 52; Fl. Ind. II (1832) 634; Wight Ic. t. 152.—PLATE 426.

A glabrous tree often reaching 15 m. high; bark grey. Leaves 10-30 by 5-12.5 cm., membranous, obovate-oblong or oblanceolate, shortly acuminate, slightly crenate-denticulate, glabrous, base cuneate; main nerves 10-20 pairs, spreading or ascending, prominent beneath; petioles 2.5-6 mm. long. Flowers 3.8-5 cm. across, distant, in pendulous many-flowered racemes 30-60 cm. long, terminal or from the axils of fallen leaves; buds globose; pedicels slender, 6-8 mm. long; bracteoles minute, caducous. Calyx turbinate; tube funnel-shaped in bud; lobes 2-3, ovate, acute, 9-13 mm. long. Petals 4, oblong-elliptic, acute, 1.9-2.5 cm. long. Style 3.8-4.5 cm. long. Fruit 5-6.3 by 4.5-5 cm., ovoid, circular in horizontal cross-section or very bluntly 4-lobed, nearly smooth, crowned with the persistent calyx-lobes; pericarp leathery. Seed solitary, ovoid-ellipsoid, 4.5 cm. long.

Distribution: Eastern and western sea-coasts of India, Malay Peninsula.—Malaya, Polynesia.

The root resembles Cinchona in medicinal virtues. It has deobstruent and cooling properties. The fruit is efficacious in coughs, asthma and diarrhœa. The seeds are used in colic and ophthalmia.

The kernels of the drupes with milk are given in jaundice and other bilious diseases. The seeds are aromatic; used also in parturition.

The pulverised fruit is used as a snuff; and, combined with other remedies, is applied externally in diseases of the skin.

In Indo China, the root is used as a bitter and febrifuge; the fruit is given for cough and asthma; the kernels crushed and mixed

with flour and oil are prescribed in diarrhœa; the aromatic seeds are given in colic and in ophthalmia.

The seed is a household vermifuge in Madagascar. It is also used to stupefy fish.

Bengal: Kunda, Samudraphal—; *Betsimisaraka:* Fosatra, Fotabe, Fotobe—; *Burma:* Kyaibeng, Kyweggi—; *Canarese:* Kanaginatora, Kempuganigilu, Samudraphala—; *English:* Indian Oak—; *Hindi:* Ijjul—; *Indo China:* Ngoc nhi, Tam lang, Vang—; *Konkani:* Nivar—; *Malay:* Putat Kampong—; *Malayalam:* Katampu, Samstaravati, Samudracham, Samudrappu—; *Marathi:* Nivar—; *Nyika:* Muhorongondo—; *Sanskrit:* Nipa—; *Seychelles:* Bois mare grandes feuilles—; *Sinhalese:* Deyamidella—; *Swahili:* Mtomondo—; *Tagalog:* Botat, Malaputad, Potat, Pulat, Putad, Putat—; *Tamil:* Arattam, Isudaru, Isuvaradaru, Kadambam, Kadambu, Kogali, Kondalai, Kuchidam, Mara, Pitriyagam, Salam, Samuttrakkadambu, Samuttrappalam, Sugadaru, Sumbal, Vengadambu, Visalam—; *Telugu:* Kadapa, Kanapa, Samudrapandu—; *Visayan:* Tubatuba—.

2. **Barringtonia acutangula** Gaertn. Fruct. II (1791) 97; Bedd. Fl. Sylv. t. 204.—PLATE 427.

A glabrous tree 7.5-15 m. high; young branches slender, pale grey. Leaves 6.3-15 by 3.2-8 cm., obovate-oblong or elliptic-cuneate, the apex rounded or subacute, the margins minutely denticulate or crenulate, base much narrowed into the petiole; main nerves 10-13 pairs, spreading; petioles 3-6 mm. long. Flowers fragrant, dark scarlet, 8-13 mm. across, in slender pendulous many-flowered racemes 15-38 cm. long; pedicels 1.5-3 mm. long; bracteoles linear-lanceolate, acute, caducous. Calyx 5 mm. long; tube puberulous outside, about as long as the lobes; lobes 4, oblong, rounded, ciliolate. Petals 5 mm. long. Filaments 1.9 cm. long. Fruit 3.2-3.8 by 1.3-2 cm., bluntly quadrangular, broadest in the middle, slightly narrowed towards and truncate at each end, crowned by the small persistent calyx.

Distribution: Throughout India, Ceylon.—Malaya, N. Australia.

The juice of the leaves is given in dysentery.—The fruit is bitter, acrid, cool; astringent to bowels, vulnerary, alexipharmic,

anthelmintic; causes "vata"; useful in biliousness, diseases of the blood, bronchitis, sore eyes, headache, hallucinations; cures "tri-dosha" (Ayurveda).

The fruit is bitter, astringent, lactagogue; useful in gleet, abdominal colic, lumbar pain, syphilis, and nasal catarrh (Yunani).

The root is bitter and supposed to be similar to Cinchona in its properties. It is also held to be cooling and aperient. The seeds are very warm and dry, used as an aromatic in colic and in parturition, also in ophthalmia.

In Bombay, the root is considered to be warm and stimulating and emetic, often prescribed alone or in combination with other medicines as an external application in colds. A few grains are often given as an emetic to children suffering from catarrh, and seldom fail to induce vomiting.

The juice of the leaves is given in diarrhœa. The kernels are given in diarrhœa with sago and butter.

The fruit rubbed in water is administered as an emetic. The powdered seeds are used as snuff in headache.

The seeds in conjunction with other drugs are recommended for the treatment of snake-bite (Bapat); but they are not an antidote to snake-venom (Mhaskar and Caius).

In Cambodia, the bark is given as an astringent in diarrhœa and blennorrhagia, and as a febrifuge in malaria; externally it is applied to the bites or stings of poisonous insects. The wood is used as a hemostatic in metrorrhagia. The fruit is given as an astringent and tonic in gingivitis.

Assam: Hendol—; *Bengal:* Hijal, Kumia, Samundar—; *Bombay:* Ijal, Ingar, Kanapachethi, Samundarphal, Twara—; *Burma:* Kyaitha, Kyenikyi—; *Cambodia:* Rang—; *Canarese:* Holekauva, Mavinkubia, Niruganigily—; *Ceylon:* Adambu—; *Cutch:* Samundraphula—; *Deccan:* Ijal, Ingar, Panniari, Samundraphal—; *English:* Indian Oak, Small Indian Oak—; *Gujerati:* Samundraphala—; *Hindi:* Hijgal, Ijal, Ingar, Jujar, Neora, Panniari, Samundarphal—; *Kolami:* Saprung—; *Konkani:* Nivar—; *Koya:* Tarrepu—; *Madras:* Samuttrappalei—; *Malayalam:* Attampu,

Attupera, Nirppera, Seriyasamstaravati—; *Marathi:* Dattephal, Ingli, Jugli, Newar, Niwar, Piwar, Samudraphala, Sathaphala, Tiwar—; *Monghyr:* Ijar—; *Mundari:* Dundi, Saparung—; *Naguri:* Samundarbaha—; *Sanskrit:* Abdhiphala, Ambudhiphala, Ambuja, Dhatriphala, Hijjala, Ijjala, Nichula, Nishula, Samudraphala, Shosha, Sindhuphala, Udadhiphala, Yaha—; *Santal:* Hinjol—; *Sinhalese:* Ellamidella—; *Tamil:* Aram, Kadambu, Kadappai, Kanatti, Niba, Perungaduppai, Sengadambu—; *Telugu:* Kadamu, Kadapa, Kanapa, Kanigi—; *Tulu:* Nirdaddal—; *Urdu:* Samandarphala—; *Uriya:* Hinjolo, Nijhira—.

3. **Barringtonia speciosa** Forst. Char. Gen. Pl. 76, t. 38; Wight Ic. t. 547.

A rather small or moderate sized tree with a close round head, bark pale grey, branchlets very stout, marked with prominent leaf-scars, young parts glabrous. Leaves very large, 25-30 cm., crowded, sessile, obovate, tapering to base, rounded at apex, entire, perfectly glabrous, polished and shining on both sides, midrib very stout and broad. Flowers very large, about 18 cm. diam., on very stout glabrous pedicels 7.5-10 cm. long, in a terminal erect raceme, buds nearly globular, apiculate; calyx-tube about 13 mm., bluntly quadrangular, glabrous, limb veiny, splitting into 2 or 3 concave segments, petals usually 4 (rarely 5), very slightly connate, about 6.3 cm., broadly oval, concave; staminal ring slightly adnate to base of petals, filaments 7.5-10 cm., erect; ovary inferior, 4-celled, ovules 6-8 in each cell, style as long as stamens. Fruit large, depressed, about 10 cm. high, quadrangular, bluntly pointed, crowned with persistent calyx-lobes, angles usually acute, pericarp very thick, smooth and shining, pale brownish-yellow, texture light fibrous-spongy, with strong fibres round the seed. Seed over 5 cm., ovoid.

Distribution: Ceylon, Andamans, Singapore, shores of Malaya, Australia and Polynesia.

The bark has narcotic properties.

In Indo China, the fruit is used as a fish poison.

Andamans: Dodda—; *Betsimisaraka:* Fotabe, Fotobe—; *Burma:* Kyaigyee, Kyi—; *Canarese:* Samudraphala—; *Indo China:*

Bonnet carre, Bang bi, Co ban tuc—; *La Reunion:* Badamier de l' Inde, Bonnet carré, Bonnet de prêtre—; *Philippines:* Bitug, Bonetes—; *Sinhalese:* Mudilla—; *Tagalog:* Botong, Botongbotong—; *Tamil:* Ondalam, Samuttira, Samuttirappalam, Semmulli—; *Telugu:* Suraponna—; *Visayan:* Bitoon, Bitung, Botong—.

CAREYA Roxb.

Trees or a small undershrub. Leaves alternate, crowded at the ends of the branches, penninerved, not dotted. Flowers large and handsome, in racemes or interrupted spikes. Calyx-tube campanulate or ovoid, not produced above the ovary; limb deeply 4-lobed. Petals 4, imbricate. Stamens very numerous, epigynous, in several rows, slightly connate at the base; filaments very long, the innermost and outermost rows often without anthers, the intermediate perfect; anthers versatile, dehiscing longitudinally. Ovary inferior, 4-(rarely 5-) celled, crowned by an annular disk; ovules numerous, in 2 rows on axile placentas. Fruit large, globose, fleshy, indehiscent, crowned with the calyx-limb. Seeds numerous, nesting in fleshy pulp; albumen 0; embryo large; cotyledons obsolete.—Species 5. Indo-Malayan.

C. arborea Roxb. is used medicinally in Cambodia and in Australia.

1. **Careya arborea** Roxb. Corom. Pl. III (1819) 14, t. 218; Wight Ill. tt. 99 & 100.—PLATE 428.

A medium sized deciduous tree, bark dark grey exfoliating in thin strips. Leaves alternate, 15-30 by 7.5-15 cm., broadly obovate or obovate-oblong, rounded or shortly acuminate, crenate-denticular, rather membranous, glabrous, lateral nerves 10-12 pairs; petiole 0-1.8 cm. long, stout, margined. Flowers 6.3-9 cm. across, white, ill-smelling, sessile, in thick swollen hard terminal spikes each with a central elliptic bract and 2 linear lateral ones. Calyx about 2.5 cm. long, tube campanulate, not produced above the ovary; lobes 4, rather shorter than the tube, oblong, obtuse, stiff, erect. Petals 4, 3.8-5 cm. long, elliptic-oblong, obtuse or subacute. Stamens very

numerous, epigynous, in several rows; filaments equalling or slighting exceeding the petals, connate into a tube at the base, the innermost and outermost rows usually without anthers; anthers versatile, dehiscing longitudinally. Disk annular, crowning the top of the ovary. Ovary 4-celled (rarely 5-celled); ovules numerous, biseriate, axile. Fruit 6.3-7.5 cm. diam., globose, green, glabrous, crowned with the calyx-segments and remains of the style.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Siam.

The bark is pungent, hot, dry; alexiteric, anthelmintic; useful in tumours, dyspepsia, colic, " vata ", bronchitis, urinary discharges, piles, leucoderma, skin diseases, epileptic fits.—The fruit is acrid, anaphrodisiac, cures " kapha " (Ayurveda).

The bark and fruit are astringent.

In Bombay, the flowers as well as the juice of the fresh bark with honey are given as a demulcent in coughs and colds.

The flowers are given in Sind as a tonic after child-birth.

In snake-bite the fresh bark is applied to the bitten part and an infusion of the same is taken internally. In combination with other drugs the bark is prescribed for snake-bite (Charaka, Sushruta) and scorpion-sting (Charaka, Vagbhata).

The Mundas of Chota Nagpur use the root, the bark, and the leaves to kill fish, at least during the hot weather.

Australian aborigines use the leaves as a vulnerary and maturant.

The bark is neither an antidote to snake-venom (Mhaskar and Caius) nor to scorpion-venom (Caius and Mhaskar).

In Cambodia, the bark is used as an antipyretic and antipruritic in eruptive fevers more particularly in small-pox.

Balaghat: Gumar—; *Banda:* Kumbhi, Pilu, Vakamba—; *Bengal:* Kamba, Kumbh, Kumbhi, Kumhi, Vakamba—; *Bhumij:* Kum—; *Bombay:* Kombi, Kumbha, Kumbi, Kumbia—; *Burma:* Bambway, Banbwe—; *Cambodia:* Roluos—; *Canarese:* Alagavvele, Daddal, Doddala, Gavvahannu, Gavvele, Goddadayippe, Hennumatti, Kaulu, Kaval, Pilu—; *Celyon:* Arimaru, Kasaddai, Panichai—; *Chhindwara:* Kumri—; *English:* Wild Guava—;

Garo: Dambel—; *Gond:* Gummar—; *Gujarat:* Kumbi—; *Hindi:* Kamba, Khumbi, Kumbh, Kumbhi, Kumbi, Kumhi, Vakamba—; *Indo China:* Kandal, Ngo dong, Vung—; *Kadir:* Poyu—; *Karen:* Taguyi—; *Khond:* Kumbe—; *Kolami:* Asunda—; *Konkani:* Kumbio—; *Koya:* Budatadadimma, Budatare—; *Kumaon:* Kumbhi—; *Lepcha:* Boktok—; *Madras:* Peyttandi—; *Malay:* Putat kedang—; *Malayalam:* Alam, Pela, Pelu, Pera, Pilu, Uka—; *Mandla:* Gumar—; *Marathi:* Kuba, Kumbha, Kumbhasala, Kumbia, Kumbya, Vakumbha—; *Mysore:* Gavuldu—; *Mundari:* Asandudaru, Kombir, Kumbir—; *Naguri:* Kimbakom—; *Nepal:* Kumbhi—; *Portuguese:* Pereira brava—; *Punjab:* Vakhumba—; *Reddi:* Darepi, Duddippa—; *Sanskrit:* Bhadrendrani, Girikarnika, Kaidarya, Kalindi, Katabhi, Katambhara, Kinihi, Kshudrashyama, Kumbhi, Madhurenu, Mahakatabhi, Mahashaundi, Mahashwata, Nabhika, Patali, Pilu, Shatapada, Shaundi, Shirishapatri, Shwetakinihi, Shyamala, Sitakatabhi, Svadupushpa, Vishaghnika—; *Santal:* Kumbir—; *Saora:* Kumbhi—; *Sinhalese:* Ahatte, Kahata—; *Taleing:* Kabuay, Kumbi—; *Tamil:* Ayma, Karekku, Kumbi, Pela, Pudattanri—; *Telugu:* Araya, Buddaburija, Budatadadimma, Budatanevadi, Duddippa, Gadhava, Govadi, Kumbhi—; *Tulu:* Daddal—; *Uriya:* Kumbhi—.

MELASTOMACEAE.

Herbs or shrubs, rarely erect trees, sometimes climbers. Leaves opposite (rarely whorled), simple, equal or unequal, exstipulate, usually petiolate, often 3-11-nerved, the nerves converging from the base towards the apex (rarely penninerved). Flowers regular, hermaphrodite, in spikes, panicles or corymbs, rarely solitary or fascicled. Calyx-tube free or partly or entirely adherent to the ovary by longitudinal septa; limb truncate, 3-6-lobed, or calyptrate. Petals as many as the calyx-lobes, inserted on the mouth of the calyx-

limb, sometimes oblique, very rarely cohering at the base, imbricate. Stamens as many or more commonly double as many as the petals and inserted with them (very rarely subindefinite), 1-seriate, the alternate stamens shorter or sometimes rudimentary, rarely all equal; filaments various, glabrous or glandular, inflexed in bud; anthers basifixed, opening at the apex by 1 or 2 pores rarely by slits down the face, the connective sometimes appendaged. Ovary sometimes wholly free, usually variously adherent, 3-6-celled (1-celled in MEMECYLON); ovules numerous (except in MEMECYLON), on axile, parietal or free central placentas; style terminal, usually filiform. Fruit usually enclosed in the calyx-tube, capsular or baccate, breaking up irregularly or by slits through the top of its cells. Seeds many (usually 1 in MEMECYLON); albumen 0; cotyledons small (larger and much folded in MEMECYLON).—Genera 200. Species 2,500.—Tropical and subtropical regions.

A. Seeds curved through half a circle, minutely punctate
   1. Stamens all alike. Fruit capsular .... OSBECKIA.
   2. Stamens very unequal .... MELASTOMA.
B. Stamens equal, anthers short, opening by pores or short slits. Berry 1-seeded
      Stamens 8 .... MEMECYLON.

Astringent properties predominate in the Order.

MEMECYLON Linn.

Trees and shrubs, quite glabrous; branches usually terete. Leaves sessile or shortly petiolate, coriaceous, ovate or oblong, quite entire, usually penninerved. Flowers usually axillary or from below the leaves (rarely terminal), in fascicles, panicles or short umbels, blue or white. Calyx quite glabrous; tube broadly campanulate or hemispheric; limb dilated, truncate or shortly 4-lobed. Petals 4, broadly ovate or orbicular, obtuse or apiculate. Stamens 8, equal; filaments filiform; anthers short, the cells opening by slits, the connective not elongate at the base, thickened at the back, ending in an obtuse spur or horn behind. Ovary inferior, 1-celled, glabrous, the apex convex or depressed; ovules 6-12, whorled about a free central placenta; style filiform; stigma punctiform. Berry globose, umbili-

cate at the apex, normally 1-seeded. Seed large; embryo involute; cotyledons acute.—Species 130.—Palaeotropics.

1. Leaves 5-15 cm., elliptic or oblong, amplexicaul	2. *M. amplexicaule.*
2. Leaves 5 cm., opaque, very narrow-oblong, obtuse, base attenuate	3. *M. angustifolium.*
3. Leaves 3.8-9 cm. elliptic or ovate-acute at both ends, hardly acuminate	1. *M. umbellatum.*

M. polyanthemos Hoo. f. is used medicinally in the Gold Coast.

1. **Memecylon umbellatum** Burm. Fl. Ind. (1768) 87.—*M. edule* Roxb. Corom. Pl. I (1795) 59. t. 82.—*M. tinctorium* Koen. ex W. & A. Prodr. 319; Wight Ill. t. 93.—PLATE 429 (under *M. edule* Roxb.).

A small tree; young branches terete, pale when dry. Leaves 3.8-7.5 by 1.6-3.8 cm., elliptic or ovate, subacute or shortly and bluntly acuminate, glabrous, dark green and polished above, paler beneath, usually attenuated but sometimes rounded at the base, margins slightly revolute; midrib prominent; lateral nerves obscure; petioles 2.5-5 mm. long. Flowers numerous, in umbellate cymes from the axils of the fallen leaves on the old wood; peduncles several together, 3-10 mm. long, elongating in fruit; ultimate pedicels 2.5-3 mm. long, very slender; buds pyriform. Calyx 2.5 mm. long, campanulate before expansion (saucer-shaped when expanded), 3 mm. across the mouth when flowering; limb truncate or 4-toothed; teeth, when present, small, triangular. Disk without or with very faint rays. Berry globose, 6 mm. diam., purplish black, crowned, though rather inconspicuously, with the calyx-limb, 1- (less commonly 2-) seeded.

Distribution: W. Peninsula, mostly on the coast. Inland mostly in evergreen and semi-evergreen shrub. Orissa, Assam, Sylhet, Tenasserim, Ceylon, Malay Peninsula.—Malay Archipelago.

The leaves are used as a cooling astringent; used in conjunctivitis as a lotion; and, given internally in leucorrhœa and gonorrhœa. They should be bruised in a mortar and infused in boiling water (Ayurveda).

In the Konkan, the bark, with equal proportion of cocoanut

kernel, ajwan seeds, yellow zedoary and black pepper, is powdered and tied up in a cloth for fomentation or applied as a lep to bruises.

The root in decoction is considered very beneficial in excessive menstrual discharge.

Andamans: Pitanig—; *Bombay:* Angun, Anguni, Anjana, Anjuna, Karpa, Kurpa, Yalki—; *Burma:* Myenphaetenyet—; *Canarese:* Alamaru, Alle, Archeti, Gandukepala, Harchari, Lakhonde, Neymaru, Nibidalle, Udaballi, Udidalle—; *Ceylon:* Kaya, Kurrekaya, Pandikaya—; *English:* Iron Wood Tree—; *Ilocano:* Cacha, Candon—; *Konkani:* Ronzoni—; *Malay:* Dalek ayer, Dalek putih—; *Malayalam:* Anakkayavu, Kalayam, Kanila, Kannavu, Kasavu, Kayavu, Netunjetti—; *Marathi:* Anjani, Anjun, Kurpa, Limba—; *Sanskrit:* Anjani—; *Saora:* Korrenyi—; *Sinhalese:* Dedikaha, Kaian, Korakaha, Vellikaha—; *Tagalog:* Coles, Cules, Culis—; *Tamil:* Alli, Anjani, Kasa, Kasai, Kaya, Perungaya, Pungali, Puvai, Sirugasa—; *Telugu:* Alli, Midalli, Peddalli, Manjiyalli—; *Tulu:* Alimaru, Alli, Mundi, Ollekodi—; *Uriya:* Bonohorono, Niroso—; *Visayan:* Saguinsin—.

2. **Memecylon amplexicaule** Roxb. Fl. Ind. II, 260.—*M. microstomum* Clarke in Hook. f. Fl. Brit. Ind. II, 557.

Small tree, about 12 m. tall. Leaves very coriaceous, sessile, broadly elliptic, blunt, shortly cordate; nerves very indistinct, 8.2-12.5 cm. long, 3.3-5 cm. wide. Flowers small, under 2.5 mm. long, numerous, pure white in dense glomeruli 2 cm. across. Calyx funnel-shaped, narrowed below the wide margin. Petals short, ovate. Fruit globular, 1.5 cm. through.

Distribution: Southern mountains of Malay Peninsula.

The root is ecbolic.

A decoction of the flowers and shoots is used in skin diseases.

Canarese: Bandikya, Gandukepala, Neymaru—; *Coorg:* Ollekodi—; *Kadir:* Kayavu—; *Malayalam:* Kannavu, Kasavu—; *Tamil:* Perungacha, Vachi—; *Tulu:* Ollekodi—.

3. **Memecylon angustifolium** Wight Ic. t. 276.

A small shrub, 1.8-2.4 m., with many erect slender branches, twigs subquadrangular. Leaves 5-7.5 cm., linear or lanceolate-

linear, almost sessile, much tapering to base, caudate-acuminate or rounded at apex, stiff, shining above, paler and dull beneath, midrib depressed on upper surface, lateral veins invisible. Flowers on slender pedicels, 2 or 3 times as long as calyx, umbellate or paniculate, peduncles under 6 mm., disk without rays. Fruit small, about 4 mm., black-purple.

Distribution: Southern India, Ceylon.

The bark is used as a tonic and refrigerant.

Canarese: Belavakana, Udidalle—; *Malayalam:* Attukanila—; *Tamil:* Vellaikkaya—.

MELASTOMA Linn.

Shrubs, usually erect and strigose-hairy. Leaves petiolate, oblong or lanceolate, usually coriaceous and quite entire, 3-7-nerved. Flowers terminal, solitary, fasciculate or panicled, showy, purple, usually 5-merous. Calyx-tube strigose, setose or paleaceous, ovoid or campanulate; lobes deciduous, ovate or lanceolate, usually about as long as the tube and alternating with subulate teeth. Petals equal in number to the calyx-lobes, sometimes pilose on the back. Stamens twice as many as the petals, unequal; those opposite the calyx-lobes longer and with purple anthers, the connective produced below the cells and ending in 2 blunt lobes; those opposite the petals with yellow anthers, the connective not or scarcely produced and ending in 2 blunt tubercles. Ovary ovoid, more or less adnate to the calyx-tube, usually 5-celled, bristly on the apex; ovules numerous; style filiform; stigma obtuse. Berry coriaceous or fleshy, irregularly dehiscent, enclosed in the persistent calyx-tube. Seeds minute, numerous, cochleate.—Species 50.—Tropical and E. Asia.

1. Hairs closely appressed at their base to the calyx-tube .... 1. *M. malabathricum*
2. Hairs on the calyx-tube long, at their base spreading then ascending or patent .... 2. *M. decemfidum.*

M. malabathricum Linn. is used medicinally in Indo China, the Philippine Islands, Tahiti, and New Caledonia; *M. candidum* D. Don., *M. decemfidum* Roxb., *M. repens* Desr., *M. sanguineum* Sims., *M. villosum* Sims. in Indo China.

1. **Melastoma malabathricum** Linn. Sp. Pl. (1753) 390.

A much-branched shrub sometimes reaching 2.4 m. high. Young branches, petioles, and nerves of the leaves beneath densely clothed with appressed flat lanceolate acuminate paleaceous hairs. Leaves somewhat rigid, 5-11.5 by 1.6-4.5 cm., ovate-oblong or lanceolate-oblong, acute, strigose above with appressed thick hairs, softly hairy between the nerves beneath, 5-nerved, the outer nerves fine and close to the margin, base usually rounded; petioles 1-1.3 cm. long. Flowers in terminal corymbose 1-5-flowered panicles; pedicels about as long as the calyx-tube; bracts 0.6-1.6 cm. long, oblong-lanceolate, shortly stalked, clothed on the back with scaly hairs. Calyx clothed all over with silvery lanceolate scaly hairs; tube broadly campanulate; lobes 1 cm. long, lanceolate, acute, deciduous; intermediate teeth 4 mm. long, subulate, bristle-pointed. Petals 2-2.5 cm. long, obovate, rounded or truncate at the apex, narrowed at the base. Filaments yellow. Anthers alternately yellow and red. Ovary crowned at top with numerous silvery lanceolate hairs about 2.5 mm. long; style nearly 2.5 cm. long, exceeding the stamens. Fruit 1.3 cm. long, broadly ovoid, truncate, bursting irregularly usually in a circle, and exposing the 5 large purplish black pulpy placentas covered with numerous minute seeds.

Distribution: Throughout India except the Desert, Ceylon.

The leaves are used in India in cases of diarrhœa and dysentery.

In Indo China, the leaves and flower tops are given as an astringent in leucorrhœa and chronic diarrhæa.

In the Philippine Islands, a decoction of the leaves is used as an astringent in diarrhœa and dysentery. A decoction of the bark is prescribed as a gargle in catarrhal pharyngitis and aphthae, and as a lotion for scabies and ulcers.

In Tahiti, the whole plant is considered astringent and commonly used in diarrhœa and dysentery. It is used as a vulnerary in New Caledonia.

Assam: Futki—; *Burma:* Myetpyai, Myetpye, Shame—; *Canarese:* Ankerki, Doddanekkare, Kenkarike, Liakeri, Nekkare, Nekkarike—; *English:* Indian Rhododendron—; *Indo China:* Da mau

don, Dia thiem, Mua se te bong—; *Konkani:* Nankeri—; *Lepcha:* Tungbram—; *Malay:* Sendudok—; *Malayalam:* Katali—; *Marathi:* Palore—; *Michi:* Shapti, Tunka—; *Nepal:* Choulisi, Tulasi—; *New Caledonia:* Kundubouedou—; *Sinhalese:* Bowitteya, Katakaluwa, Mahabowittya—; *Tagalog:* Granatis—; *Tamil:* Kadalai—; *Telugu:* Pattudu—; *Tulu:* Nekkare—; *Uriya:* Koroti—.

2. **Melastoma decemfidum** Roxb. Hort. Beng. 90.—*M. sanguineum* Sims in Bot. Mag. t. 2241.

Large lax shrub about 1.8 m. tall. Branchlets and petioles covered with stiff bristles. Leaves lanceolate or ovate-lanceolate, 3- to 5- nerved, glabrous except for a few scattered hairs above, 6.3-12.5 cm. long, 1.5-4.5 cm. wide; petioles 6.5-13 mm. long. Flowers solitary or 2 to 3 together, 5-7.5 cm. across. Calyx-tube 6.4-13 mm. long, densely clothed with long stiff pink hairs; teeth linear acuminate, about half as long as the globose urceolate tube. Petals 3.8 cm. long, broadly obovate, pale rose. Stamens shorter.

Distribution: Burma, Malay Peninsula, Cochin-China.

The root, the leaf, and the fruit are astringent and used in diarrhœa and diseases of the uterus.

In Cambodia, the roots are used in the treatment of liver complaints with jaundice. They are considered stimulant and tonic, and an infusion is prescribed in malaise and vertigo.

Indo China: Ken chea das, Mua ba, Prea—.

OSBECKIA Linn.

Herbs or shrubs, usually erect, branches usually 4-angled. Leaves opposite or sometimes ternate, entire. Flowers terminal, solitary capitate or panicled, often conspicuous. Calyx-tube much produced beyond the ovary, usually covered with simple or compound bristly hairs; lobes 4 or 5, alternating with as many appendages. Petals 4 or 5, usually broadly obovate. Stamens 8 or 10, equal or subequal, all similar. Ovary semi-inferior, 4-5-celled, bristly at the apex, ovules numerous. Fruit a capsule opening by pores at its apex.—Species 50.—Palaeotropics.

1. Anthers large, produced into a very short beak .... 2. *O. crinita.*
2. Anthers attenuate upwards, not beaked .... 1. *O. nepalensis.*

O. crinita Benth. is used medicinally in Indo China.

1. **Osbeckia nepalensis** Hook. Fl. Exot. t. 31.

A shrub; branches with appressed hairs. Leaves 7.5-10 cm. elongate oblong-lanceolate 5-nerved softly hairy on both surfaces, petiole less than 3 mm. Bracts ovate, glabrous, villous, centre of the backs villose. Flowers purple-mauve or white, in small rather close corymbs, calyx-tube with large flat scales fringed with bristles of which 5 prominently alternate with the calyx-teeth; calyx-teeth large broad-lanceolate glabrous ciliate. Fruit 20 by 8 mm., campanulate, truncate, scales permanent.

Distribution: Subtropical Himalaya from Nepal eastwards, Khasia Hills, Ava.

In Lakhimpur, the flowers are pounded and applied to sores in children's mouths (Carter).

Assam: Bagaphatkala—.

2. **Osbeckia crinita** Benth. in Wall. Cat. 4066.

Shrub 1.2-2.4 m., much-branched; branches with spreading hairs. Leaves 5-10 cm., lanceolate or elliptic-lanceolate, bristly on both surfaces, narrowed or subcordate at base; petiole 3-10 mm. Flowers large, 4-fid and not infrequently 5-fid, purple or pure white, in somewhat close corymbs, calyx-tube with many stellate rufous-brown hairs; teeth stellate hairy; bracts ovate, acute, usually very hairy on the back. Bristles on the apex of the ovary about 20. Fruit 2 cm. including the neck, ovoid, suddenly narrowed into the cylindric neck, often nearly glabrous, neck equalling or exceeding the fruiting ovary much longer than its own breadth.

Distribution: Sikkim and Bhutan, 4,000—8,500 ft., Khasia Mts. 3,000—6,000 ft. Burma.

A decoction of the dried leaves is used for toothache by the Man of Cha-Pa in Tongking.

Indo China: Dok Ka nau, Tau nang bung, Thao gia mau don—; *Lepcha:* Number—; *Nepal:* Chulasi—.

LYTHRACEAE.

Trees, shrubs, or herbs; branches often 4-gonous. Leaves entire, usually opposite, sometimes alternate or whorled; stipules 0. Flowers hermaphrodite, usually regular, cymose or paniculate. Calyx usually free, persistent; primary teeth or lobes 3-6, with sometimes as many accessory teeth added, valvate. Petals as many as the primary teeth of the calyx, rarely fewer or 0. Stamens definite or indefinite, inserted at various heights on the calyx-tube. Ovary superior (rarely inferior), 1-6-celled; ovules many, placentas axile, rarely parietal; style usually filiform; stigma capitate, rarely 2-lobed. Fruit capsular or baccate, membranous or coriaceous, girt round the base of the calyx or entirely included in it (or rarely surmounted by it), 2-6-celled or, by the imperfection of the partitions, 1-celled, variously dehiscent (rarely indehiscent). Seeds numerous, sometimes winged; albumen 0; embryo usually straight; cotyledons usually oblong or orbicular, flat, 2-auricled at the base and with a short radicle—Genera 21. Species 500.—All zones except the frigid ones.

A. Herbs .... AMMANNIA.
B. Shrubs or trees
  I. Stamens 12 .... WOODFORDIA.
  II. Stamens 8 .... LAWSONIA.
  III. Stamens ∞
    a. Fruit 3-6-celled, 3-6-valved capsule .... LAGERSTROEMIA.
    b. Fruit a many-celled indehiscent berry .... SONNERATIA.

Some are astringent; others are resiniferous, acrid, emetic, cathartic, and diuretic.

AMMANNIA Linn. (sens. restr.).

Annual glabrous herbs, growing in damp places. Stem and branches more or less 4-gonous. Leaves decussate, sometimes alternate, sessile, often dilate-cordate at the base, 1-nerved. Dichasia (1-) 3- multiflowered, sessile or pedunculate, axillary; bracteoles small, membranous. Flowers typically 4-merous (exceptionally 5-6-merous), never heterostylous. Calyx campanulate or urceolate,

after flowering semiglobose or globose, herbaceous, 8-nerved; appendages 0 or short. Petals 0-4, fugaceous, obovate or rotund. Stamens 2-8, episepalous. Ovary sessile, incompletely 2-4 (-5) -locular or 1-locular. Style 0 or longer than the ovary. Capsule globose or ellipsoid, included or half-exserted, very thinly membranous, breaking up irregularly in a transverse direction. Seeds very numerous, minute.—Species about 20.—Cosmopolitan, chiefly in tropical regions.

1. Cauline leaves opposite or alternate, oblong or narrow-elliptic .... 1. *A. baccifera.*
2. Leaves opposite, elongate, oblong, sessile, subauriculate ...... 2. *A. auriculata.*

The genus has little therapeutical importance.

1. **Ammannia baccifera** Linn. Sp. Pl. ed. 2 (1762) 175; Blatter & Hallberg in Journ. Bomb. Nat. Hist. Soc. XXVI (1918) 215.—*A. vesicatoria* Roxb. Fl. Ind. I (1820) 427.—PLATE 430.

Glabrous, erect or subscandent, 8-65 cm. high, often branching, branches usually opposite. Leaves 7-70 mm. long, 1-16 mm. broad, lower leaves usually opposite, cauline ones opposite or alternate, oblong or narrow-elliptic, narrowed at the base, or rounded or subcordate, or subauriculate, usually obtuse or subacute. Dichasia (1-) 3- multiflowered (dense axillary clusters or loose, but very short cymes), sessile or subsessile. Flowers distinctly pedicelled, sessile or subsessile. Calyx 1-2 mm. long; tube hemispheric, teeth 4, broad, triangular, acute, cornua minute or absent. Petals 0 or minute; stamens as long as the lobes or slightly shorter. Capsule depressed, globose, 1-2 mm. diam., covered up to ¼ or ½ by the calyx-tube, slightly or much longer than the teeth.

Distribution: All over India, the most common species.—Africa, S. and E. Asia, Australia, Europe (where it is probably introduced).

The leaves are bitter; appetiser, laxative, stomachic, aphrodisiac; remove "kapha", "vata", blood troubles, strangury; cause biliousness (Ayurveda).

The leaves are very bitter and acrid; the juice causes ulcers and blebs. They are used as an appetiser (Yunani).

The leaves are exceedingly acrid; they are used universally by

the natives to raise blisters in rheumatic pains, fevers, etc. The fresh leaves, bruised and applied to the part intended to be blistered, perform their office in the course of half-an-hour or a little more, and most effectually. The leaves are applied to cure herpetic eruptions.

In the Konkan, the plant, fresh or dried, is administered in decoction with ginger and *Cyperus* root for intermittent fevers, and its ashes are mixed with oil and applied to herpetic eruptions.

The juice of the plant is given internally in spleen; but it causes great pain, and the result is not certain (T. N. Mukerji).

There is much difference of opinion regarding the value of the plant as a blistering agent.

Bengal: Banmarach, Dadmari—; *Bombay:* Aginbuti, Agiya, Banmarich, Bharjambol, Guren—; *Deccan:* Aginbuti, Agiya, Benmarich, Bharjambol, Guren—; *English:* Blistering Ammania—; *Gujerati:* Jalaagiyo—; *Hindi:* Dadmari, Janglimehndie, Kuranda—; *Malayalam:* Kallarvanchi—; *Marathi:* Bharajambhula—; *Mundari:* Garatulsi, Garaturusi—; *Punjab:* Dederbuti—; *Sanskrit:* Kshetrabhusha, Kshetravashini, Kurandika, Kuranti, Sukaranda, Vikata—; *Tagalog:* Apoyapoyan, Biaspogo—; *Tamil:* Kallarivi, Nirumelneruppu—; *Telugu:* Agnivendapaku—; *Urdu:* Agya—.

2. **Ammannia auriculata** Willd. Hort. Berol. I (1806) t. 7; Blatter & Hallberg in Journ. Bomb. Nat. Hist. Soc. XXVI (1918) 211.—*A. senegalensis* DC. Prodr. III (1828) 77, sec. Guill. et Perr. (non Lam.); Clarke in Hook. f. Fl. Brit. Ind. II (1879) 570.—PLATE 431 (under *A. senegalensis*).

Stem up to 57 cm. long; stem and branches winged in the upper part. Leaves 1.5-7.7 cm. long, 3-14 mm. broad, or the upper ones smaller, the 2 lowest sometimes cuneate, the rest auriculate, linear or sublanceolate, slightly acute. Dichasia 1-3-15-flowered, slightly lax; pedicel of the central flower 3-17 mm. long. Calyx 1.5-2 mm. long, in fruit subglobose or almost semiglobose; lobes 1/3 or 1/2 the length of the tube; cornua minute, at last evanescent, rarely almost as long as the lobes. Petals violaceous, purple or white. Stamens 4-8, inserted 3/4- almost 1/2 way down the tube, 1/3 or 1/2

exserted beyond the lobes. Style up to twice as long as the ovary. Capsule 2-3.5 mm. in diam., as long as the calyx-lobes or slightly longer.

Distribution: Rajputana, Baluchistan, Kuram Valley, Chitral, British Tibet, Kashmir, Upper Gangetic Plain, Punjab, Bengal—China, Afghanistan, Persia, Trans-Caucasus, Africa, Australia, N. & S. America.

The plant is used as a blistering agent.

Punjab: Dadmari, Fauglimehndi—.

WOODFORDIA Salisb.

Shrubs, often arborescent; young branches quadrangular, more or less tomentose, the older terete or compressed beneath the nodes, glabrate. Leaves decussate, more or less coriaceous nigro-punctate beneath, penninerved and reticulately veined. Flowers in paniculate cymes, on axillary peduncles, rarely solitary; pedicels bracteate at or near the base. Calyx tubular, the limb sometimes dilated, more or less contracted above the fruit; teeth 6, short, with as many minute accessory teeth. Petals 6, minute, or 0. Stamens 12, inserted near the bottom of the calyx-tube, much exserted, the alternate ones longer; filaments filiform; anthers broadly ovate or subrotund. Ovary sessile, cylindric, 2-celled (sometimes completely so); ovules numerous, minute, inserted on thick placentas adnate to the axis of the ovary; style filiform, longer than the ovary, slightly longer than the stamens, sometimes narrowed at the apex; stigma punctiform. Capsule covered by the calyx, ellipsoid, often splitting the calyx, thinly membranous, often bursting irregularly. Seeds small, narrowly cuneate-obovoid.—Species 2.—India, China, Tropical Africa, Madagascar.

The therapeutic uses of *W. fruticosa* Kurz. have not been recorded outside India.

1. **Woodfordia fruticosa** Kurz in Journ. As. Soc. Beng. XL, II (1871) 56.—*W. floribunda* Salis' Parad. Lond. (1806) t. 42.—*Lythrum fruticosum* Linn. Sp. Pl. ed. 2 (1762) 641.—PLATE 432B (under *W. floribunda* Salisb.).

A straggling leafy shrub reaching 3.6 m. high; branches long,

spreading; bark smooth, cinnamon-brown, peeling off in fibres; young shoots terete, often clothed with fine white pubescence. Leaves 5-9 by 1.3-2.5 cm., opposite or subopposite, sometimes in whorls of 3, sessile, ovate-lanceolate, acute, softly velvety above, usually hoary and always nigro-punctate beneath, base rounded or cordate; main nerves 6-12 pairs, arcuate, prominent beneath, uniting in a distinct intramarginal nerve. Flowers numerous, in short 2-15- (rarely 1-) flowered cymes from the axils of former, less commonly of present leaves; pedicels short, glandular-pubescent. Calyx 1.6 cm. long, striate, covered with glandular dots, with a small campanulate base and a long slightly curved bright red tube which is slightly contracted above the included capsule; mouth oblique; teeth about 2.5 mm. long, triangular, acute. Petals slightly longer than the calyx-teeth, narrowly linear, produced at the apex to a long fine point. Capsule 1 cm. long, usually splitting the calyx near the base, irregularly dehiscent. Seeds cuneate-obovoid, brown, smooth.

Distribution: Throughout India, Ceylon, Baluchistan.—Tropical Africa, Madagascar, China, Japan, Summatra, Java.

The bark is pungent, acrid, cooling, toxic; alexiteric, uterine sedative, anthelmintic; used in thirst, dysentery, leprosy, erysipelas, diseases of the blood.—The flowers have a flavour; dry; same properties as the bark; useful in leucorrhœa, menorrhagia, toothache (Ayurveda).

The dried flowers are an astringent tonic in disorders of the mucous membranes, hæmorrhoids, and in derangements of the liver; also considered a safe stimulant in pregnancy.

The powdered flowers were given in 10 to 20 grains doses with honey in dysentery and were found to be beneficial (Koman).

According to Bapat the fresh leaves are an excellent remedy in cases of snake-bite. The juice is given internally, a few drops poured into each nostril, and some rubbed on the part bitten.

The leaves are not an antidote to snake-venom, and they are useless as an errhine or as an external application in the treatment of snake-bite (Mhaskar and Caius).

Bengal: Dawa, Dawai, Dhadki, Dhai, Dhainti, Dhaura, Dhan,

Dhao, Dhawayi, Dhowa—; *Bhil:* Datti—; *Bhumij:* Dadki—; *Bombay:* Dhauri, Dhavri, Dhavshi, Dhayati, Dowari—; *Burma:* Pattagyi, Yetkyi—; *Canarese:* Are, Bela—; *Central Provinces:* Dhaiti, Dhowai, Dhowra, Dhuvi, Surtari—; *Gond:* Petisurali, Pitva, Surteyli—; *Gujarat:* Dhawadina, Dhawani—; *Hindi:* Dawi, Dha, Dhai, Dhau, Dhaula, Dhaura, Dhawai, Dhawi, Dhawla, Dhewtie, Santha, Thawi—; *Hova:* Pisopiso—; *Kangra:* Dhai, Guldaur—; *Kashmir:* Thai, Thawi—; *Khond:* Patalabeluri—; *Kolami:* Dhawe, Icha—; *Konkani:* Dhauri—; *Kumaon:* Dhai, Dharla, Dhaula, Dhaura, Thawa—; *Kurku:* Dhi, Kinni—; *Lepcha:* Chunghyekdum—; *Malayalam:* Tatire—; *Marathi:* Dayatti, Dhaiphal, Dhaiti, Dhazatichi, Phulsatti, Phusati—; *Mundari:* Icaba, Icadaru—; *Nepal:* Dahiri, Dhagerako, Dhangyars, Laldairo—; *North-Western Provinces:* Dhai—; *Oudh:* Dhewti—; *Porebunder:* Dhawadi—; *Punjab:* Dahai, Dawi, Dha, Dhaur, Dhawi, Dhaz, Khurd, Tau, Tawi, Thai—; *Pushtu:* Datki—; *Reddi:* Jaji, Kerani—; *Sakalave:* Iratrika, Lambohenjana—; *Sanskrit:* Agnijvala, Agnivala, Bahupushpika, Dhataki, Dhatri, Dhatripushpika, Dhatupushpi, Dhavani, Guchhapushpi, Kumuda, Kunjara, Madhavasini, Madyapushpa, Parvati, Rodhrapushpini, Sanghapushpi, Sidhupushpi, Subhiksha, Tamrapushpi, Tivrajvala, Vanhipushpi, Vanhishikha—; *Santal:* Ichak—; *Saora:* Jaji—; *Sind:* Dhai—; *Sinhalese:* Malitta—; *Tamil:* Velakkai—; *Telugu:* Dhataki, Dhatupushpika, Gaddapisiniki, Godari, Jaji, Reyyamanu, Sirinji, Tellamanu—; *Uriya:* Dhatubiphula, Dhatuko, Dhobo, Horibadi, Patalabeluri—.

Lawsonia Linn.

A glabrous shrub; young branches sometimes 4-gonous, the older terete, often spinescent. Leaves opposite, shortly petiolate, ovate-lanceolate, entire. Flowers in terminal panicled cymes. Calyx-tube short; lobes 4, spreading, broadly ovate; accessory teeth 0. Petals 4, very shortly clawed, inserted at the top of the calyx-tube. Stamens 8 (rarely 4), inserted at the base of the calyx-tube in pairs opposite the calyx-lobes; anthers broadly oblong, the connec-

tive thick. Ovary subglobose, 2-4-celled; ovules many, placentas axile; style thick, slightly longer than the stamens; stigma capitate. Capsule globose, stalked in the base of the calyx-tube, coriaceous, irregularly breaking up, ultimately 1-celled. Seeds closely packed on a central placenta, angular, pyramidal.—Species 1.—Palaeotropics.

L. inermis Linn. is used medicinally in Indo China, the Philippine Islands, French Guiana, West and North Africa.

1. **Lawsonia inermis** Linn. Sp. Pl. (1753) 349 (charact. ampl.).—*L. alba* Lam. Encycl. Méth. III (1789) 106.—PLATE 432A (under *L. alba* Lam.).

A glabrous much-branched shrub; lateral branches 4-gonous, often ending in a spinous point. Leaves 1.3-3.2 by 0.6-1.6 cm., elliptic or broadly lanceolate, acute or obtuse, often mucronulate, base tapering; petioles very short or 0. Flowers numerous, less than 1.3 cm. across, fragrant, white or rose-coloured, in large terminal pyramidal panicled cymes; pedicels short, slender. Calyx 3-5 mm. long, broadly campanulate; lobes 2.5-3 mm. long, ovate, acute. Petals 3 mm. long, as broad as long, suborbicular or subreniform, undulate. Stamens 8, inserted in pairs on the calyx-tube. Capsule 6 mm. diam., globose, slightly veined outside, supported by the persistent calyx and tipped with the style. Seeds trigono-pyramidal, about 2.5 mm. long, externally subtuberculate.

Distribution: Indigenous in Arabia and Persia, probably also in the drier parts of the Indian peninsula and Ceylon; cultivated and naturalized all over India.

The leaves are emetic, expectorant; allay burning sensation; cure leucoderma.—The seeds are astringent to the bowels and antipyretic; cure insanity (Ayurveda).

The leaves have a bitter bad taste; vulnerary, diuretic; useful in headache, hemicrania, lumbago, bronchitis, boils, ulcers, stomatitis, ophthalmia, syphilitic sores, amenorrhœa, scabies, diseases of the spleen; enrich the blood; favour the growth of the hair.—The flowers are vulnerary; an infusion cures headache.—The seeds are tonic to the brain (Yunani).

The bark is given in jaundice and enlargement of the spleen,

also in calculous affections; and as an alterative in leprosy and obstinate skin diseases; in decoction it is applied to burns, scalds, etc.

The leaves are a valuable external application in headache. A decoction of the leaves is used as an astringent gargle in relaxed sore throat. The fresh leaves are rubbed over the soles of the feet in the diseases known as burning of the feet; sometimes a paste made with vinegar is used for the same purpose. *Henna* is used as an emollient poultice, and the flowers are considered refrigerant. The flowers are also used as a soporific, being for this purpose placed in a pillow. The oil and essence are rubbed over the body to keep the body cool.

The Tamil physicians of Southern India make an extract from the flowering twigs and leaves much valued in the treatment of lepra (leprosy) and other depraved habits of the body.

In the Konkan, the leaf-juice mixed with water and sugar is given as a remedy for spermatorrhœa, and with milk in the condition known as "hot and cold fits."

An infusion of the flowers is given for headache, and is a good application to bruises.

Cataplasms of the bruised leaves, or fomentation with an infusion of the leaves, are much employed as a local application to bruises, sprains, and other diseases. An extract prepared from the leaves and flowers is given in leprosy.

The roots enter into the composition of a decoction used by the Malay women of Kelantan as an abortifacient.

In Cambodia, the roots are considered diuretic and pectoral; they are given in gonorrhœa and in bronchitis.

In Annam, the leaves are used in the treatment of leprosy, jaundice, and more especially herpes.

In French Guiana, the bark is considered an emmenagogue and the leaves are used as a vulnerary.

A decoction of the bark is given as an emmenagogue in Guinea. The leaves are considered vulnerary; they are used in the treatment of leprosy and skin diseases.

The primordial use of henna appears to have been more a matter

of hygiene than that of augmenting beauty. The aqueous infusion of the leaves applied to the external surfaces of the body was used as a prophylactic against certain skin diseases which are quite prevalent in the eastern tropical and semi-tropical countries. Another property of this infusion was said to be that of producing a cooling sensation to the part applied, acting gently on the sweat-glands, reducing their activity, benefiting both health and comfort. The root of the henna plant was upheld as a specific in leprosy and also in drying up certain ulcers of the mouth and gums. The flowers of the plant are still used in preparing a delicate highly esteemed perfume of the East said to be equal in aroma to our lilac. The fruit is claimed to be emmenagogue (Ind. & East. Druggist, 1920).

Arabic: Alhenna, Henna, Henneh, Hinna, Yoranna—; *Belgaum:* Iswan—; *Bengal:* Mehedi, Mendi, Shudi—; *Bhote:* Simru—; *Bombay:* Henne, Mendie—; *Burma::* Dan, Danbin—; *Cambodia:* Krapeu—; *Canarese:* Goranta, Gorante, Goranthu, Korate, Madaranga—; *Central Provinces:* Mehndi, Mhendi—; *Chinese:* Tche Kia Hoa—; *English:* Camphire, Cypress shrub, Egyptian Privet, Henna Plant, Jamaica Mignonette, Mindie, Tree Mignonette—; *French:* Alcana d' Orient, Alkanna d' Avicenne, Alkanna d' Orient, Henné, Racine à farder, Thomarhendi d' Avicenne, Troëne d' Egypte—; *French Guiana:* Réséda de Cayenne—; *Greek:* Kypros—; *Gujarat:* Medi, Mendi—; *Hausa:* Lalle—; *Hebrew:* Bapar—; *Hindi:* Hena, Mehndi, Mhindi—; *Indo Chana:* Chi giap hoa, Khao thien, Khao youak, Kok khao, Krapin, Kupin tuc, Mong tay, Mong tay nhuom—; *Konkani:* Meti—; *Lambadi:* Bhurara—; *Las Bela:* Mehndi—; *Malay:* Inai—; *Malayalam:* Mayilanji, Pontalasi—; *Marathi:* Mendhi, Mendi—; *Mundari:* Bind, Bindi, Mindi—; *Persian:* Hina, Panna—; *Philippines:* Cinamomo, Cinamomo del pais—; *Punjab:* Hinna, Mehndi, Nakrize, Panwar—; *Rajputana:* Mehendi—; *Sanskrit:* Dvivranta, Kokadanta, Medika, Mendhika, Nakharanjaka, Nakharanjani, Ragagarbha, Ragangi, Ranjaka, Sahashara, Sugandhapushpa, Timira, Yavaneshta—; *Santal:* Mihndi—; *Sind:* Mendi—; *Sinhalese:* Maritondo—; *Spanish:* Henne—; *Swahili:* Muhanoni, Muheni—; *Tamil:* Aivanam, Aivani, Korandam, Kurandagam, Kurinji, Pidai,

Ponninpuvalamarudondri, Marudondri, Mayilainandi—; *Telugu:* Goranta, Gorata, Gorinta, Krommi, Kuravakamu, Maida, Pachapeddagoranta—; *Tulu:* Madirengi—; *Urdu:* Mehendi—; *Uriya:* Mehendi, Mendi, Monjuati, Olota, Rongota—; *Woloff:* Foundenn—.

LAGERSTROEMIA Linn.

Trees or shrubs. Leaves opposite, distichous or the uppermost alternate, petiolate, oblong or ovate, entire, often glaucous beneath. Flowers often large and showy, in axillary and terminal panicles, the ultimate branchlets usually cymose; peduncles 2-bracteate at their apex; pedicels 2-bracteolate. Calyx-tube campanulate, coriaceous, smooth or ribbed, or winged; lobes 6 (sometimes 7-9), ovate or triangular, often caudate, valvate; accessory teeth 0 or (rarely) minute. Petals 6 (sometimes 7-9) or 0, inserted at the summit of the calyx-tube, clawed more or less orbicular, wrinkled, the margin crisped, erose or fimbriate. Stamens many, inserted near the bottom of the calyx-tube; filaments much exserted. Ovary sessile at the bottom of the calyx, 3-6-celled; ovules numerous, ascending; placentas axile; style long, bent; stigma capitate. Capsule more or less adnate to the calyx, ellipsoid, coriaceous, smooth, 3-6-celled, loculicidally 3-6-valved. Seeds many (rarely few), compressed, ascending or horizontal; testa membranous, winged at the summit.—Species 25. —Palaeotropics.

1. A. tree .... 1. *L. flos-reginae.*
2. A shrub .... 2. *L. indica.*

L. indica Linn. is used medicinally in Indo China.

1. **Lagerstroemia flos-reginae** Retz. Obs. (1789) fasc. 5, p. 25.—PLATE 433.

A large tree 9-18 m. high; branches widely spreading; bark pale, smooth, flaking off in irregular pieces. Leaves 10-20 by 3.8-7.5 cm., oblong-lanceolate or elliptic, subacute, glabrous and finely reticulate on both surfaces, pale beneath, base acute or rounded; main nerves 10-13 pairs, prominent, curving upwards; petioles 6-10 mm. long, stout. Flowers 5-7.5 cm. across, in large panicles sometimes reaching 30 cm. long; pedicels stout, pubescent, thickened

upwards and articulated below the middle. Calyx turbinate, 1.6 cm. long, covered with white or ferruginous tomentum, ribbed with 12-14 prominent stout ridges, those opposite the calyx-teeth broader; teeth 6-7, triangular, acute, spreading, 6 mm. long, thickened at the edges. Petals 6-7, purple, 2.5-3.8 cm. long, suborbicular or rotund-ovate, clawed, much undulate and crumpled, spreading. Stamens all equal, shorter than the style. Capsules ellipsoid or subglobose, 2-3.2 by 1.6-2.5 cm., minutely apiculate. Seeds (including the wing) 1.25-1.45 cm. by 6-4.5 mm., glabrous, pale brown.

Distribution: Assam, Chittagong, Lower Burma, Malay Peninsula, foot of the W. Ghats up to 2,000 ft., Ceylon.—Java.

The root is prescribed as an astringent. It is considered stimulant and febrifuge.

The bark and leaves are purgative.

The seeds are narcotic.

In the Andamans, the fruit is used as a local application for aphthae of the mouth.

Assam: Ajhar, Jarul—; *Bengal:* Jarul—; *Bombay:* Bondara, Taman—; *Burma:* Eikmwe, Pyengma, Pyinma, Konepyinma—; *Canarese:* Challa, Holedachalla, Holematti, Maruvachalla, Nirbendeka—; *Garo:* Bolashari—; *Hindi:* Arjuna, Jarul—; *Kadir:* Semmaruta—; *Kolami:* Garasaikre—; *Konkani:* Tamonn—; *Magahi:* Kamaung—; *Malayalam:* Atampu, Chemmaruta, Katalpu, Manimarutu, Nirmarutu, Nirventekku, Puvalventekku—; *Marathi:* Bondara, Motabondara, Taman, Tamana—; *Mundari:* Garasekere, Kuiri—; *Sanskrit:* Arjuna—; *Santal:* Sekra—; *Sinhalese:* Murutagass, Murute—; *Tamil:* Kadali, Kadalimugai, Kadalippuva, Pumarudu—; *Telugu:* Varagogu—; *Tulu:* Challa—; *Uriya:* Ary, Jarulo—.

2. **Lagerstroemia indica** Linn. Syst. ed. X (1759) 1076.

A leaf-shedding tree, all parts glabrous, the branchlets almost winged-cornered. Leaves obovate to obovate-oblong, blunt or acute, very shortly petioled or almost sessile, chartaceous, 5-7.5 cm. long, glabrous. Flowers middling sized, crimson or white, slenderly pedicelled, solitary or in peduncled poor cymes forming a more or less branched glabrous panicle at the end of the branchlets; calyx

glabrous, without ribs or furrows, deeply 6-lobed, the lobes oblong-lanceolate, acute; petals broad, crumpled and curled, on long claws; outer 6 stamens longer and larger than the numerous inner ones. Capsules globose, more than 1.3 cm. diam., 6-celled and 6-valved.

Distribution: Throughout India, common in gardens.—Originally from China.

The bark is considered stimulant and febrifuge.

In Indo China, the bark, leaves, and flowers are considered purgative, hydragogue, drastic.

Bengal: Phurush, Telingachina—; *Bombay:* Dhayti—; *English:* Crape, Myrtle, Crepe Myrtle, China Privet, Indian Lilac—; *Hindi:* Phurush, Saoni, Telingachina—; *Indo China:* Tuong vi bang lang se, Tu vi bach nhat hong—; *Manila:* Melindres—; *Tamil:* Pavalakkurinji, Sinappu, Tindiyam—; *Telugu:* Chinagoranta—.

SONNERATIA Linn. f.

Trees growing near the sea. Leaves opposite, petiolate, coriaceous, entire. Flowers 3 together at the apices of the branches, or axillary and solitary, ebracteolate. Calyx thickly coriaceous; tube campanulate; lobes 4-8, triangular-ovate or lanceolate. Petals 0, or as many as the calyx-lobes. Stamens many, inserted in the throat of the calyx-tube, many-seriate; filaments filiform, at length reflexed; anthers versatile, reniform. Ovary free or adnate at the base to the calyx-tube, many-celled, with thin septa; ovules numerous, ascending, placentas axile; style elongate, filiform; stigma subcapitate. Berry subglobose, thick, supported by the persistent calyx, 10-15-celled, many-seeded. Seeds nesting in pulp, curved, angular; cotyledons short, foliaceous, convolute; radicle elongate, terete.—Species 6.—Indo-Malayan.

The genus has little therapeutic value.

1. **Sonneratia caseolaris** Engl. in Engl. & Prantl Nat. Pflanzenf. Nachtr. I (1897) 261.—*Rhizophora caseolaris* Linn. Sp. Pl. 635.—*Sommeratia acida* Linn. f. Suppl. 252.—PLATE 434 (under *S. acida* Linn. f.).

A small tree rarely reaching 4.5 m. high. Leaves nearly sessile,

subfleshy, 5-9.5 by 2-5.7 cm., elliptic-oblong or obovate, obtuse, much attenuated at the base. Flowers large, terminal, on very short thick pedicels; buds ellipsoid. Calyx 3.2-3.5 cm. long; tube hemispheric; lobes 6, lanceolate-oblong, acute, 2 cm. long. Petals 6, linear-oblong, 2 cm. by 3-4 mm., dark rose-coloured. Style very long, often exceeding 5 cm. Fruit 2.5-5 cm. diam., cushion-shaped, supported by the persistent calyx which forms a shallow cup, and tipped by the persistent tapering style-base which forms a point about 2.5 cm. long in its centre.

Distribution: Tidal creeks and mangrove swamps of India, Ceylon and Malay Peninsula.—Siam, Java.

The fruit is used as a poultice in sprains and swellings. The fermented juice of the fruit is said to be useful in arresting hæmorrhage.

Bengal: Archaka, Orcha—; *Bombay:* Chipi—; *Burma:* Tabu, Tamu—; *Canarese:* Kandale—; *Malayalam:* Blatti, Thirala, Tirala, Vilatti—; *Marathi:* Tiwar—; *Sinhalese:* Geddekillala, Kirilla—; *Sundriban:* Ora, Orcha—; *Tamil:* Kinnai—; *Uriya:* Sundarignua—.

PUNICACEAE.

Woody and sometimes spiny. Leaves mostly opposite or fascicled, simple, not glandular; stipules absent. Flowers hermaphrodite, terminal, solitary or clustered. Calyx coloured, tubular, adnate to the ovary, 5-7-lobed, lobes valvate. Petals 5-7, imbricate and crumpled in bud. Stamens numerous, epigynous; filaments slender, free; anthers 2-celled, dorsifixed, opening lengthwise. Ovary inferior, many-celled, cells superposed in 2 series, the lower with axile, the upper with parietal placentation; style slender, simple; ovules numerous on each placenta. Fruit a spherical berry crowned by the calyx-limb. Seeds numerous, covered with pulp; endosperm

absent; cotyledons convolute.—Genera 1. Species 2.—Orient to N.-W. India.

The root bark of *Punica granatum* Linn. contains from 0.6 to 0.7 per cent total alkaloids: pelletierine, pseudopelletierine, methyl isopelletierine, isopelletierine, and N-methylpiperidyl-2-propan-β-one.

Mannitol also occurs in the root bark.

P. granatum Linn. is used medicinally in Europe, Mauritania, Indo China, the Philippine Islands, the West Indies, Guiana, Brazil, La Reunion, and Southern Africa.

OFFICIAL:—The bark of the root (Italy); the bark of the root and stem (Belgium, Denmark, France, Germany, Russia, Spain, Turkey, United States); the bark of the root, stem, and branches (Austria, Hungary, Japan, Switzerland); the bark of the root, stem, and fruit (Holland); the bark of the root and stem, the rind of the fruit, and the flowers (Portugal).

Pelletierine tannate (Great Britain, United States).

1. **Punica granatum** Linn. Sp. Pl. (1753) 472.—PLATE 435.

A large deciduous shrub or small tree, bark smooth, grey, thin; often armed with small axillary or terminal thorns. Leaves opposite, 2.5-6.3 cm. long, oblong-lanceolate, oblong-elliptic or oblong-oblanceolate, glabrous, entire, minutely pellucid-punctate, shining above, bright green beneath, base narrowed into a very short petiole. Flowers 3.8-5 cm. long and as much across, mostly solitary, sometimes 2-4 together, terminating short shoots, sometimes apparently axillary, sessile or nearly so. Calyx-tube campanulate, adnate to and produced beyond the ovary, coriaceous, lobes 5-7, valvate. Petals 5-7, obovate, scarlet, wrinkled, inserted between the calyx-lobes. Stamens very numerous, inserted on the calyx below the petals at various levels; anthers elliptic, dehiscing longitudinally. Ovary inferior, many-celled, the cells arranged in 2 concentric circles; style long, bent; stigma capitate. Carpels early coalescing and owing to unequal growth becoming arranged into 2 tiers, 3 in the lower and 5-9 in the upper. Fruit 3.8-7.5 cm. diam., globose, tipped with the calyx-limb, rind coriaceous, woody, the interior septate with the

membranous walls of the carpels each carpel containing numerous seeds angular from mutual pressure. Seeds with a watery outer coat containing pink juice and a horny inner coat.

Distribution: From the Balkans to the Himalayas, and cultivated in many parts of India.

The root is an external vermicide.—The bark and seeds are useful in bronchitis.—The flowers are useful in epistaxis.—The unripe fruit is a good appetiser and tonic, useful in vomiting; causes biliousness.—The ripe fruit is tonic, astringent to the bowels, aphrodisiac; cures biliousness, " tridosha ", thirst, burning sensation of the body, fever, heart disease, sore throat, stomatitis.—The rind of the fruit is anthelmintic; useful in diarrhœa, and dysentery (Ayurveda).

The bark is astringent; strengthens the gums; used in piles, prolapsus ani, colic.—The flowers are styptic to the gums; check vomiting; useful in biliousness, sore eyes, ulcers, sore throat; applied to hydrocele; vulnerary.—The unripe fruit lessens inflammation; used in keratitis.—The ripe fruit is sweet; tonic, laxative, diuretic, fattening; enrich the blood; allays thirst; used in sore throat, sore eyes, brain diseases, spleen complaints, chest troubles, scabies, bronchitis, earache.—The seeds are astringent to the bowels; enrich the blood; used in vomiting, sore eyes, biliousness, scabies, liver and kidney disorders (Yunani).

Hindoo physicians use the fresh juice of the fruits as an ingredient of cooling and refrigerant mixtures of some medicines for dyspepsia. They also use the rind of the fruit and the flowers, combined with aromatics, such as cloves, cinnamon, coriander, pepper, etc., as a bowel astringent in diarrhœa. The seeds are considered to be stomachic, the pulp cardiac and stomachic.

The Arabs recommend the root-bark as being the most astringent part of the plant, and a perfect specific in cases of tapeworm; it is given, in decoction, prepared with two ounces of fresh bark, boiled in a pint-and-a-half of water till but three-quarters of a pint remain; of this, when cold, a wine-glassful may be drunk every half-hour, till the whole is taken. This dose sometimes sickens the stomach a little, but seldom fails to destroy the worm, which is soon after passed.

Pomegranate peel, combined with opium and an aromatic, such as cloves, is a most useful remedy in chronic dysentery as well as in diarrhœa. A decoction of the bark followed by a purgative, acts as an anthelmintic.

The dried bark of the stems and roots has long been used as an anthelmintic.

The bark and fruit combined with other drugs are prescribed for the treatment of snake-bite (Sushruta, Vagbhata, Rasaratnakara); the bark is also prescribed for scorpion-sting (Sushruta).

In China and Malaya, the dried pericarp or rind of the fruit is considered as astringent tonic and anthelmintic, especially for tape worms.

Europeans in South Africa use the rind of the fruit and the root medicinally. A decoction of the dried rind of the fruit is drunk for the relief of stomach-ache and in dysentery, while an infusion of the same material is taken for colitis. An infusion of the powdered fruit, rind, and rice flour is used in diarrhœas and dysenteries, and as an anthelmintic. An infusion of the rind and root was used by the early colonists as an inejction for leucorrhœa.

In the Transvaal, the powdered fruit rind is used for the treatment of dysenteries, and a decoction of the same is given as an anthelmintic. A decoction of the root is used to tape-worm in children.

Pomegranate bark is ineffective as an anthelmintic against hookworms; and it is not an antidate to scorpion venom (Caius and Mhaskar).

The bark and fruit are not antidotes to snake-venom (Mhaskar and Caius).

Afrikaans: Granaat, Granaatappel, Iralnate—; *Annam:* Cay luu, Thach luu—; *Arabic:* Rumman, Shajraturrumman—; *Assam:* Dalim—; *Bengal:* Dalimgachh—; *Bombay:* Anara, Dalimba—; *Brazil:* Roma—; *Burma:* Salebin, Talibin, Thale—; *Canarese:* Dadima, Dadimbe, Dalimbe, Hulidalimbe, Husidalimbe—; *Catalan:* Magraner—; *Chinese:* An Shih Liu, Che Lieou, Shih Liu—; *Danish:* Granattraee—; *Deccan:* Anar—; *Dutch:* Granatboom—; *English:* Pomegranate Tree—; *Ewe:* Aboda—; *French:* Balaustier, Grenadier,

Migraine—; *German:* Granatbaum, Granate—; *Greek:* Roia, Roidia, Roidion—; *Gujarat:* Dadam—; *Hausa:* Rimani—; *Hebrew:* Rimaus, Rimmon—; *Hindi:* Anar, Dhalim, Dharimb—; *Hova:* Apongabeandanitra—; *Indo China:* An thach luu, Luu, Luu chua thap, Phila, Thap luu—; *Italian:* Melogranato, Melograno—; *Jaunsar:* Danoi—; *Jhalawan:* Anar, Sor—; *Jolo:* Dalima—; *Kharan:* Hanor—; *Konkani:* Dalimb, Dallimbini—; *Kotra:* Anar—; *Kumaon:* Darim—; *Malaya:* Shak liu—; *Malayalam:* Dadiman, Matalam, Pumatalam, Raktabijam, Talimatalam, Uruyampalam—; *Malta:* Pomegranate, Melogranato, Rimmien, Rummien—; *Marathi:* Dalimba—; *Mexico:* Granado, Granado de China—; *Michi:* Madala—; *Mundari:* Anardaru—; *Naples:* Granato, Granato servaggio—; *North-Western Provinces:* Anar, Darim—; *Persian:* Anar, Darakhtenar—; *Philippines:* Granada—; *Polish:* Drzewo granatowe—; *Portuguese:* Romanzeira, Romeira—; *Potenza:* Gronuto—; *Punjab:* Anar, Daan, Danu, Daran, Dariun, Daru, Daruna, Daruni, Dharu, Jaman—; *Pushtu:* Anar, Anor, Gharnangoi, Nargosh—; *Quetta:* Anarbedama—; *Romagna:* Melagrano, Melgarne, Melingarne—; *Roumanian:* Pitligean, Pitlingean, Rodiu—; *Russian:* Granat, Granatnik—; *Sanskrit:* Bijapura, Dadima, Dadimasara, Dadimba, Dalika, Dantabija, Dantabijaka, Karaka, Kuchaphala, Kuttima, Lohitapushpaka, Madhubija, Milapatra, Milapatraka, Mukhavallabha, Nagarata, Parvarut, Phalashadava, Pindapushpa, Pindira, Raktabija, Raktapushpa, Shukadana, Shukavallabha, Sunila, Suphala, Svadvamla, Valkaphala, Vrittaphala—; *Shahrig:* Nargosa—; *Sibi:* Anar, Dahrun—; *Sicily:* Granatu—; *Sind:* Anar, Dhalim, Dharimb—; *Sinhalese:* Delun, Delungaha—; *Sinjawi:* Anangi—; *Spanish:* Granado—; *Swedish:* Granatrad—; *Tamil:* Kalumal Madalai, Madulam, Madulungam, Pumadalai, Pulimadalai, Tadimadalai, Tadimam, Tusagam—; *Telugu:* Dadimamu, Dadimba, Dalimma, Danimma, Karakamu, Pulladanimma, Puvvudanimma, Tiyyadanimma—; *Treviso:* Melogranato, Pomiingranai—; *Tulu:* Dalimbe—; *Turkish:* Nar agaci—; *Tuscany:* Granata, Melagranata—; *Urdu:* Anarmitha—; *Uriya:* Dalimbo, Dalimo—; *Verona:* Magragnar—.

ONAGRACEAE.

Herbs, rarely undershrubs, sometimes aquatic. Leaves opposite or alternate, membranous, entire or toothed, undivided (in TRAPA the submerged leaves pinnatipartite), exstipulate. Flowers hermaphrodite, regular (rarely irregular), axillary and solitary, or in spikes or racemes towards the ends of the branches. Calyx-tube wholly adnate to the ovary (½-adnate in TRAPA); limb 2-5-lobed, the lobes valvate. Petals epigynous, alternate with the calyx-lobes, rarely 0. Stamens as many or twice as many as the calyx-lobes, inserted with the petals when these are present. Ovary inferior (½-inferior in TRAPA), 1-6- (commonly 4-) celled; ovules 1 or many in each cell, pendulous or ½-ascending, placentas axile; style cylindric or subulate; stigma capitate, entire, 2-lobed or 4-fid. Fruit various dehiscent or indehiscent, membranous, capsular or bony, 1-many-celled, 1-many-seeded. Seeds exalbuminous or nearly so.—Genera 45. Species 500.—Temperate and tropical regions.

1. Seeds very many, not comose. Stamens twice as many as calyx-lobes .... JUSSIEUA.
2. Seeds 1 or 2. Stamens 4 .... TRAPA.

Slightly mucilaginous and astringent; a few are subacrid.

JUSSIEUA Linn.

Herbs or undershrubs usually growing in swamps. Leaves alternate, usually membranous and entire, rarely coriaceous and serrate. Flowers yellow or white, axillary, solitary; pedicels usually 2-bracteate at the apex. Calyx tube narrow, not or slightly produced above the ovary; teeth 4-6, acute, persistent. Petals 4-6, inserted beneath the margin of an epigynous disk. Stamens twice as many as the petals and inserted with them. Ovary 4-5-celled; ovules numerous, axile, in several vertical rows at the inner angle of each cell, placentas often prominent; style simple, sometimes very short; stigma 4-6-lobed. Capsule terete or 4-12- angled or ribbed, 4-6-celled, septicidally 4-5-valved, crowned with the disk and calyx-

lobes. Seeds numerous, without a coma; cotyledons obtuse; radicle short.—Species 50.—Tropics.

Astringent, emetic, and antidysenteric; also laxative and anthelmintic.

The following are used medicinally in Indo China—*J. prostrata* H. Lev., *J. repens* Linn., *J. suffruticosa* Linn.—; in the Philippine Islands—*J. suffruticosa* Linn.—; in the West Indies—*J. repens* Linn.—; in Brazil—*J. caparosa* Camb., *J. pilosa* Kunth., *J. suffruticosa* Linn.—; in Guiana—*J. peruviana* Linn.

1. **Jussieua suffruticosa** Linn. Sp. Pl. (1753) 388.—Plate 436.

A semi-shrubby erect perennial, 0.3-1.2 m. high; stem woody below, much-branched; branches stiff, terete, striate. Leaves nearly sessile, 5-7.5 by 0.6-2 cm., varying from linear to broadly elliptic, but usually lanceolate, acute, tapering much towards the base, villous, pubescent or subglabrous; main nerves numerous; petioles very short or 0. Flowers yellow; pedicels shorter than the calyx, pubescent; bracts minute. Calyx hairy; tube subquadrangular; lobes 4, ovate-elliptic, acute or subacuminate, 1 cm. long, hairy, obscurely nerved. Petals 4, broadly obovate, 6-10 mm. long, pinnately veined. Capsules 2.5-3.8 cm. long, subquadrangular, truncate, tapering towards the base, 8-ribbed, villous or pubescent, membranous, breaking up between the ribs which persist for some time. Seeds minute, ovoid, didymous, brown, polished.

Distribution: Throughout India, Ceylon.—Warmer regions of the World.

The plant reduced to a pulp and steeped in butter-milk, is considered useful in dysentery; a decoction is used as a vermifuge and purgative.

In Jashpur, the root is boiled and the liquid drunk for fever.

Bengal: Bunlung, Lalbunlunga—; *Canarese:* Kavakula—; *English:* Primrose Willow—; *Indo China:* Muong dat—; *Malayalam:* Karyampu, Kattukkaryampu—; *Marathi:* Panalavanga—; *Mundari:* Datijudiring—; *Sanskrit:* Bhulavanga—; *Santal:* Dakichak, Petrada—; *Sinhalese:* Haemarago—; *Tagalog:* Balacbac, Malapaco,

Malapoco—; *Tamil:* Kattukkrambu, Krambuppundu, Nirkkrambu—; *Telugu:* Niruyagnivendramu—; *Uriya:* Bilolobongo—.

Trapa Linn.

Aquatic herbs. Leaves alternate, floating, petiolate, rhomboid, toothed, stipulate; petiole spongy, inflated. Flowers axillary, solitary. Calyx-tube short, adnate to the lower part of the ovary; calyx-limb 4-partite, 2 or all the segments persistent and becoming spinescent on the fruit. Petals 4, sessile, inserted at the base of an undulate epigynous disk. Stamens 4, inserted with the petals. Ovary 2-celled, ½-inferior, conical above the calyx, attenuated into a persistent subulate style; ovule solitary in each cell, pendulous; stimga capitate. Fruit bony, 1-celled, obovoid, with 4 angles 2 or all of which carry spines, indehiscent, with a short cylindric beak at the top through which the radicle is protruded. Seed 1, inverse; cotyledons very unequal; radicle incurved.—Species about 5.—Central and S. Europe, tropical Africa and Asia.

Astringent and resolvent.

The following are used medicinally in Europe and China—*T. natans* Linn.—; in Indo China—*T. bispinosa* Roxb., *T. maximowiczii* S. Korsh.—.

1. **Trapa bispinosa** Roxb. Hort. Beng. (1814) 11.—Plate 437.

Stems flexuose, ascending in the water, the submerged parts furnished with numerous opposite pairs of green root-like spreading pectinate organs (? floating roots), arising immediately below the position of the stipules of fallen leaves and reaching sometimes 6.3 cm. long. Leaves alternate, crowded on the upper part of the stem, the blade as broad as, or more commonly broader than long, 3.8-5 by 3.8-5.7 cm., rhomboid with a triangular apex, somewhat truncate and entire at the base, irregularly inciso-serrate in the upper part, dark green mottled with brown, glabrous and shining above, reddish purple and densely pubescent beneath; petioles terete, at first short, but ultimately reaching as much as 12.5 cm. in length, the upper part hairy, the lower glabrous, dilated near the apex into a large

fusiform spongy float; stipules linear-lanceolate, acute, membranous, caducous. Flowers few, axillary, solitary; pedicels short, stout, hairy, incurved during flowering, afterwards bending down beneath the water in which the fruit ripens. Calyx pubescent; lobes 4, lanceolate, acute, of which 2 are persistent, becoming spines on the fruit. Petals 4, obovate, about twice as long as the calyx-lobes, crenulate on the margins, pure white. Fruit obovoid, angular, 2-2.5 cm. long and broad, with a short conical beak in the centre at the apex and a spreading flattened very sharp spinous horn at either side; radicle beneath the central beak, from which it protrudes in germination.

Distribution: Throughout India, Ceylon.—Malaya, tropical Africa.

The fruit is sweet, acrid; cooling, indigestible; aphrodisiac, astringent to the bowels, antipyretic; causes "vata", removes "kapha", "tridosha" cures leprosy, burning sensation, fatigue, inflammations, diseases of the blood, urinary discharges, biliousness, strangury; useful in fractures, erysipelas (Ayurveda).

The fruit is sweetish; aphrodisiac, appetiser, antipyretic; useful in chronic fevers, lumbago, pain, thirst, sore throat, biliousness, bronchitis, bad teeth (Yunani).

The nuts are farinaceous, and used as food; considered cool and sweet, useful in bilious affections and diarrhœa. The nuts are also used in the form of poultices.

The fruit in combination with other drugs is recommended for snake-bite (Bhavaprakasha, Yogaratnakara, Rasaratnakara) and scorpion-sting (Rasaratnakara, Vaidyavinoda).

The fruit is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

In Cambodia, the rind of the fruit is considered tonic and febrifuge; an infusion is given in asthenia due to malaria or other fevers.

Bengal: Paniphal—; *Cambodia:* Krachap—; *Deccan:* Shingari—; *English:* Singhara Nut—; *French:* Macre—; *Gujarat:* Shingoda, Singodi—; *Hausa:* Gedar ruwa, Kwankwarita—; *Hindi:* Singhara—; *Indo China:* Au, Au muoc, Chi thuc—; *Kashmir:*

Gaunri—; *Malayalam:* Karimpolam—; *Marathi:* Shingada—; *Punjab:* Gaunri, Singhara—; *Sanskrit:* Jalakantaka, Jalaphala, Jalashaya, Jalasuchi, Jalavalli, Kshirashukla, Sanghatica, Shringakanda, Shringamula, Shringaruha, Shringata, Shringataka, Shukladugdha, Trika, Trikonaphala, Trikota, Varikantaka, Varikubshaka, Vishani—; *Sinhalese:* Ikiliya—; *Tamil:* Singhara—; *Telugu:* Kubyakam—; *Urdu:* Singhara—.

SAMYDACEAE.

Trees or shrubs. Leaves usually alternate and distichous, petiolate, simple, entire or serrate, the teeth sometimes terminated by a gland; stipules small or 0. Flowers regular, usually hermaphrodite, inconspicuous, fasciculate, racemose, or paniculate, pedicelled, the pedicels articulated at the base, bracteolate. Calyx coriaceous, persistent; tube short or long, rarely adnate to the ovary; lobes 3-7, imbricate or valvate. Petals as many as the calyx-lobes or 0, perigynous, imbricate. Stamens definite or indefinite, often alternating with staminodes, equidistant or collected into fascicles opposite to the petals; filaments filiform or capillary, free or connate at the base or throughout their entire length. Ovary free or rarely adnate to the calyx-tube, sessile, 1-celled; ovules very many or few, attached to 2-5 (usually 3) parietal placentas; style 1, capitate or 3-fid at the apex, or styles 2-5, simple or capitellate. Fruit capsular or rarely indehiscent, 1 celled, 1-many-seeded, 2-5- (usually 3-) valved at the apex or throughout its entire length, the valves alternating with the placentas. Seeds usually few (always fewer than the ovules), oblong or angular, albuminous, usually arilled; cotyledons oblong, orbicular or cordate, often foliaceous; radicle very short or elongate and terete. —Genera 17.—Tropics of both hemispheres, rare in subtropical regions.

Therapeutically the Order is of very little importance.

CASEARIA Jacq.

Shrubs or small trees. Leaves alternate, distichous, entire or serrate, often marked with pellucid dots or lines; stipules small, lateral, caducous. Flowers small (clustered in the axils in the Indian species); pedicels articulated above the base. Calyx inferior, deeply 4-5-lobed; lobes imbricate, obtuse, persistent. Petals 0. Stamens 6-15 (rarely 20-40), inserted on the tube or at the base of the calyx, alternating with as many staminodes; filaments free or connate into a ring at the base with one another and the staminodes; connective sometimes penicillate at the apex. Ovary free, ovoid, 1-celled; ovules many, parietal; style short; stigma capitate, or stigmas 3. Capsule succulent, globose or ellipsoid (when dry sometimes 3-angular or 6-ribbed), 3- rarely 2- valved. Seeds many, angular or obovoid, with a fleshy usually coloured aril; testa coriaceous or crustaceous; albumen fleshy; embryo straight; cotyledons oblong or orbicular, flat; radicle terete.—Species 150.—Warmer parts of the globe, most abundant in America.

A. Adult leaves and petioles glabrous
    1. Leaves 10 by 7 cm. .... 1. *C. graveolens.*
    2. Leaves 7.5-15 by 2.5-5 cm. .... 2. *C. esculenta.*
B. Adult leaves on the midrib beneath together with the petiole more or less pubescent .... 3. *C. tomentosa.*

The genus has astringent and resolvent properties.

C. fragilis Vent. is used medicinally in La Reunion; *C. adstringens* Mart., *C. lingua* Camb., and *C. ulmifolia* Vahl. in Brazil.

1. **Casearia graveolens** Dalz. in Kew Journ. Bot. IV (1852) 107.

A shrub or small tree; young branches obtusely angular, glabrous; new leaves appearing at the end of April. Leaves 9-20 by 3.8-10 cm., coriaceous and hard when old, broadly elliptic, obtuse or shortly acuminate, more or less crenate-serrate, finely reticulately veined, glabrous; main nerves 8-12 pairs, slender, prominent beneath; petioles 6-13 mm. long; stipules 8 mm. long, lanceolate-subulate, very deciduous. Flowers with a disagreeable odour, green, numerous, in axillary clusters; pedicels articulated above the base, very short

when in flower, elongating in fruit, pubescent below the articulation, glabrous or subglabrous above it. Calyx pubescent outside, 3-4 mm. long, deeply 5-lobed; lobes oblong, obtuse, concave, green. Stamens 8, equalling the calyx, the alternating staminodes villous, filaments glabrous. Style as long as the stamens, about 1.5 mm. long; stigma large, discoid. Fruit deep yellow, 2-2.5 cm. long, ellipsoid or subglobose, smooth shining, 3-valved. Seeds about 12, ovoid, compressed, with a scarlet aril.

Distribution: Upper Gangetic Plain, westwards to Chenab, ascending to 5,000 ft., Garhwal Himalaya, Kumaon, Sikkim, Burma, Konkan, Deccan, N. Circars in Ganjam.

The fruit is used for poisoning fish.

Almora: Pimperi, Pipri—; *Canarese:* Hanise—; *Dehra Dun:* Nar, Nara—; *Garhwal:* Narwa, Phempsi, Pimperi, Pipri—; *Gond:* Girchi, Tundri—; *Haldwani:* Narra—; *Hindi:* Aloal, Chilla, Chilli, Kathera, Naro, Pimpri—; *Kharwar:* Beri—; *Kolami:* Rari—; *Koya:* Vasanga—; *Kurku:* Rewat—; *Malayalam:* Anavananni, Cherukannan—; *Marathi:* Bokhada, Bokhara, Moda—; *Santal:* Newri—; *Saora:* Girivudi—; *Uriya:* Kakoli, Khonji, Kirtti—.

2. **Casearia esculenta** Roxb. Fl. Ind. II (1832) 422.—PLATE 438.

A small tree reaching 6-9 m. high; bark yellowish white, smooth; young branches slender, pale, glabrous. Leaves thinly coriaceous, 7.5-15 by 3.2-5.7 cm., elliptic-oblong to elliptic-lanceolate, subacute, usually shortly acuminate, tapering to the base; main nerves 6-10 pairs; petioles 6-16 mm. long, glabrous; stipules minute, scale-like. Flowers in clusters in the axils of past and present leaves; pedicels longer than the calyx, articulated above the base, glabrous above the articulation, surrounded at the base by numerous small bracts. Calyx glabrous; lobes 4 or 5, suborbicular, 2.5 mm. long and broad, sometimes ciliolate, concave. Stamens 8; staminodes oblong, truncate and villous at the apex, shorter than the stamens; filaments pubescent. Style scarcely any. Fruit 2 cm. long, ellipsoid or subglobose, orange-yellow, glabrous, dehiscing by 2 or 3 (usually 3) thick valves. Seeds many, covered by a large fleshy lacerate scarlet aril.

Distribution: Konkan, S. M. Country, N. Kanara, S. Kanara to Cochin, E. Coast, in the Circars and southwards, Carnatic, Ceylon, Malay Peninsula.

The root is bitter, acrid, sweetish, with a flavour; refrigerant, antipyretic, alexiteric, tonic to the liver; cures biliousness, "vata", diseases of the blood, leucoderma, bronchitis, asthma, burning sensation of the body, hallucination, thirst (Ayurveda).

The root is used as a purgative by the hill people. It is a popular remedy for diabetes in the whole of the Deccan.

Bombay: Bokra, Mori—; *Canarese:* Doddahanise, Hillehanise—; *Malayalam:* Cherukannan, Malampavatta, Pannimurangam, Vellakannan—; *Marathi:* Kulkulta, Mori, Pate—; *Sanskrit:* Bhurigandha, Bhutagandha, Daitya, Divya, Gandhadhya, Gandhakuti, Ghandhamadini, Gandhini, Kuti, Mura, Muramansi, Puragandhavati, Surabhi, Talaparni, Talaparnika—; *Sinhalese:* Walwareka—; *Tamil:* Kakkaippilai, Kilar, Kottargovai, Kolayayili, Kutti, Venjanduvar—; *Telugu:* Kondajunguru, Kondapragara—.

3. **Casearia tomentosa** Roxb. Fl. Ind. II (1832) 421.—*C. elliptica* Willd. Sp. Pl. II, 628; Wight Ic. t. 1849.—PLATE 439.

A small tree attaining 9 m. high; bark thick, ash-coloured; branchlets tomentose or pubescent, rarely glabrous. Leaves 6.3-18 by 3.8-7 cm., oblong, acute, more or less serrulate, or sometimes almost entire, slightly pubescent or glabrous above, pubescent or tomentose (densely so on the nerves) beneath, base usually rounded or subcordate (more or less obliquely); main nerves 8-10 pairs; petioles 4.5-9 mm. long, densely pubescent; stipules minute, densely pubescent, deciduous. Flowers greenish white, crowded in axillary fascicles; pedicels less than 6 mm. long, densely pubescent, articulated near the base. Calyx pubescent; tube scarcely 0.8 mm. long; lobes 3 mm. long, broadly elliptic, obtuse. Stamens usually 8; filaments glabrous; staminodes clavate, much shorter than the stamens, villous at the apex. Style 0.8 mm. long; stigma subglobose. Fruit broadly ellipsoid, 2 cm. long, smooth and shining, 3-valved. Seeds embedded in a soft pulpy scarlet mass consisting of the agglomerate arils.

Distribution: Throughout India from the base of the Himalaya to Ceylon, Malay Peninsula.—N. Australia.

The bark is bitter and applied externally in dropsy.

The leaves are used in medicated baths.

The pulp of the fruit is a useful diuretic.

The Mundas of Chota Nagpur throw the crushed fruit into the water to benumb fish.

Bhil: Tordul—; *Bombay:* Bairi, Chillara—; *Canarese* Biliyubina, Hanise—; *Gond:* Thundri, Tundri—; *Gujarati:* Gholoum, Sunjhal—; *Hindi:* Bairi, Bhari, Bheri, Chilara, Chilla—; *Kharwar:* Beri—; *Kolami:* Rore—; *Koya:* Vasanga—; *Kumaon:* Chilla—; *Kurku:* Khesa—; *Malayalam:* Anakkarana, Anavananni, Vapunnakannan—; *Manbhum:* Maun—; *Marathi:* Karei, Lainja, Massei, Modgi, Modi—; *Mundari:* Curcidaru, Curcudaru—; *Santal:* Chorcho—; *Tamil:* Kadichai, Kaludukkutti, Kottal, Kutti—; *Telugu:* Chilakaduddi, Girugudu, Kalamisvari, Pisiki, Vasanga—; *Uriya:* Girari, Giridi, Kakoli, Khonji, Kirtti—.

CARICACEAE.

Small trees, often with an unbranched crown of long petioled alternate palmi-lobed leaves and with milky juice. Flowers monoecious or usually dioecious, the females shortly cymose, solitary, or fascicled axillary, the males smaller in axillary panicles, 5-merous. Calyx short Corolla of male gamopetalous, of female much larger polypetalous. Stamens in the male 10 in 2 whorls in the corolla-tube. Female with staminodes. Ovary 1- or 5- celled with short style and 3-5 palmately branched lobes. Hermaphrodite flowers occasionally occur in 3 forms, either the stamens are only 5 hypogynous in an otherwise nearly normal female flower, or the stamens are 10 perigynous inserted high up in a tube adnate to the corolla, or the stamens are 10 epigynous closely adnate to the ovary with their bases connected by a ridge. Ovules very numerous parietal. Fruit a large 1-celled or 5-celled berry. Seeds many with an outer sappy

and an inner hard testa, albuminous.—Genera 4. Species 45.—Tropical America and Africa.

The Order is therapeutically inert.

Carica Linn.

Soft-wooded trees or shrubs with milky juice, stem generally simple, or with few branches, leaves at the ends of the branches. No stipules. Flowers in axillary racemes or panicles, uni- or bisexual. Calyx small, 5-lobed. Corolla in the male flowers gamopetalous, 5-lobed; in the female flowers, of 5, linear-oblong deciduous petals. Stamens 10, inserted in the mouth of the corolla, those oppostie to the lobes on short filaments, those alternate with them sessile; anthers adnate to the filaments, 2-celled dehiscing longitudinally. Ovary free, ovules numerous, attached in 2 rows to 5 parietal placentæ. Fruit fleshy, sulcate, indehiscent with numerous seeds. Embryo straight, in a fleshy albumen; cotyledons flat, oblong.—Species 30.—Warm America.

The unripe fruit is used as a remedy for worms; the ripe fruit is applied to wounds and ulcers.

C. papaya Linn. is used medicinally in Cambodia, Malaya, the Philippine Islands, Brazil and Guiana, La Reunion, Guinea and the Gold Coast; *C. digitata* Spreng. & *C. dodecaphylla* Vell. are also used in Brazil.

1. **Carica papaya** Linn. Sp. Pl. 1036.—Plate 440.

A small soft-wooded, fast-growing, and short-lived tree, with large glabrous palmatifid and palminerved leaves, 30-60 cm. across, on long hollow petioles, forming a round tuft at the top of the stem. Flowers on axillary panicles, pale yellow, fragrant, generally dioecious, but occasionally a few female flowers on a male plant. Male flowers in long drooping panicles. Female flowers in short clusters. Ovary 1-celled. Stigma sessile, 5-lobed, lacerated. Fruit succulent, indehiscent, 1-celled. Seeds numerous, black, enclosed in sweet mucous pulp, and covered with a loose hyaline skin or arillus; testa thick, brittle.

Distribution: Considered a native of the W. Indies, the shores of the Gulf of Mexico and perhaps of Brazil.—Cultivated throughout our region.

The ripe fruit is tasty; astringent to the bowels, aphrodisiac; increases "kapha" and "vata"; removes biliousness; cures insanity (Ayurveda).

The ripe fruit is stomachic, appetiser, digestive, carminative, diuretic; cures inflammations, enlargement of the spleen; removes urinary concretions; relieves obesity; used in hæmoptysis, bleeding piles, wounds of the urinary tracts; useful in ringworm, skin diseases, psoriasis (Yunani).

The milky juice of the unripe fruit has long been considered anthelmintic, and principally effectual in the expulsion of lumbrici. It is applied locally to the os uteri to procure abortion.

The seeds are also said to be vermifuge; but they are mostly used as an emmenagogue. It is a popular belief that they may cause abortion.

In the Gold Coast, the roots are said to cure yaws, and also piles. The root is ground up and mixed with salt forming a paste which is then mixed with water and the resulting solution is used as an enema, which is supposed to cause abortion in pregnant women. The dry leaves when placed in water, form a yellowish-red liquor which is drunk to cure stomach troubles.

In French Guinea, the roots, the leaves, and the seeds are used as anthelmintics. A decoction of the leaves is given as a purgative to horses.

In Brazil, the seeds are used as a vermifuge. As a cosmetic the milky juice of the unripe fruit is applied for freckles and for making the skin smooth and delicate; it is given in small doses against roundworms with excellent results.

In Central and South America, the seeds are used as anthelmintic and emmenagogue. They are given as a thirst quencher, and they form a component part of a drink used in fevers. They are also used as a carminative. Syrups, wines, elixirs made from ripe fruit are expectorant, sedative, and tonic. Pimples are cleaned by the milk of the unripe fruit (*Am. Journ. Pharmacy*, 1903).

In Kelantan, the milky juice of the unripe fruit is used as a poison.

In Cambodia, the roots are considered diuretic; they are used internally as a hemostatic in metrorrhagia. The seeds are prescribed in bites and stings from poisonous insects.

Carpaine, an alkaloid with an intensely bitter taste and a strong depressing action on the heart, has been obtained from the fruit and seeds, but especially from the leaves (*Journ. Chem. Soc.;* 1893).

Papaine, a digestive enzyme, valued in medicine and in the preparation of chewing gums, is obtained from the white, thin latex or juice.

Adang: Adiba—; *Annam:* Trai du du—; *Arabic:* Aanabahehindi, Ambahindi—; *Ashanti:* Bororfere, Brorfenini, Brosownini—; *Awuna:* Adiba, Aduba, Yevudiba—; *Bengal:* Papeya, Pappaiya, Pepiya—; *Betsimisaraka:* Papay, Voapaza—; *Bombay:* Papai—; *Brazil:* Mamao, Mamamoeiro, Mamoeiro—; *Burma:* Pimbosi, Simbosi, Thimbaw, Timbosi—; *Cambodia:* Lohong si phle—; *Canarese:* Goppe, Pangi, Pappayi, Parangi—; *Cochin China:* Kay du du—; *Cutch:* Papaya—; *Deccan:* Popai—; *English:* Melon Tree, Papaw, Papaya, Papeta, Pawpaw, Tree-melon—; *Ewe:* Adiba—; *Fanti:* Borosow, Brosownyin—; *French:* Figuier des îles, Figuier des nĕgres, Melon des Tropiques, Papayer—; *Fulah:* Budibaga—; *Ga:* Akpakpa—; *Gujarat:* Chibda, Erandakakdi, Jhadchibhadi, Kath, Papayi, Papia—; *Hausa:* Gwanda, Gwanda masar—; *Hindi:* Andakharbuja, Papaya, Papita, Pepiya, Popaiya—; *Krobo:* Gor—; *Kwang Tung:* Mou Koua—; *Madagascar:* Mapaza, Paza—; *Malaya:* Papaya, Pohunbetek—; *Malayalam:* Kappalam, Karmmosu, Pappayam—; *Marathi:* Papaya—; *Maya:* Put—; *Mexico:* Melon zapote, Papaya, Papayo—; *Mundari:* Ambritdaru, Amritdaru, Dindapabita, Jomejaradaru, Pabitadaru—; *Nepal:* Mewa—; *Persian:* Aanabahehindi, Àmbahindi—; *Philippines:* Papaya—; *Punjab:* Arandkharbuza, Kharbuza—; *Sanskrit:* Chirbhita, Erandachirbhita, Nalikadala—; *Sind:* Chibhado, Katha, Paputa—; *Sinhalese:* Papaw, Pepol—; *Tagalog:* Capayas—; *Tamil:* Pappali, Pappayi, Parangiyamanakku, Pasalai—; *Telugu:* Boppayi, Madananaba, Madhurnakamu—; *Tulu:*

Bappangayi—; *Twi:* Brorfre—; *Urdu:* Erandkharbujah—; *Uriya:* Omrytobhonda, Popoya—; *Visayan:* Capayas—.

PASSIFLORACEAE.

Shrubs or herbs usually twining. Leaves alternate, petiolate, simple, lobed, or palmately 3-7-foliolate, frequently glandular beneath; petiole usually glandular; stipules 0 or twin, deciduous or persistent. Tendrils axillary or 0. Flowers hermaphrodite or unisexual, solitary, racemose or cymose-paniculate, often showy; bracteoles 3 (rarely 0), minute and scattered or foliaceous and forming an epicalyx. Calyx-tube short or long, coriaceous or herbaceous, persistent; lobes 5, imbricate. Petals 0 or as many as the calyx-lobes, inserted in the tube of the calyx, free or connate into a campanulate corolla, membranous, coriaceous or fleshy, imbricate, often marcescent. Corona simple or double, springing from the throat or bottom of the calyx, tubular or split into erect or radiating filaments (rarely 0). Stamens 5, on a gynophore or free at the base, perigynous; filaments subulate or filiform, free monadelphous; anthers didymous or oblong, basifixed or versatile, the cells dehiscing introrsely. Ovary superior, free, 1-celled, sessile or stalked; ovules numerous, attached to parietal placentæ, the funicle often expanded into a cup-shaped aril; styles 1 or 3; stigmas capitate, clavate or dilated, sometimes many-fid. Fruit baccate or capsular. Seeds numerous, usually ovoid, compressed, often pitted, covered with a fleshy aril; albumen fleshy; embryo rather large; cotyledons leafy; radicle terete.—Genera 18. Species 380.—Tropical and warm temperate regions.

1. Flowers hermaphrodite. Stamens hypogynous
   Twining herbs or shrubs .... PASSIFLORA.
2. Flowers unisexual. Stamens perigynous .... ADENIA.

They are mostly therapeutically inert. When active they exhibit narcotic, anthelmintic, diuretic, and antiperiodic properties.

ADENIA Forsk.

Twining herbs or undershrubs, tendril-bearing. Leaves entire, palmately lobed or pinnatifid, usually with large glands on the leaves and the top of the petiole; stipules 0 or inconspicuous. Flowers monoecious, usually small, in axillary cymes, the peduncles often produced into tendrils. Calyx-tube campanulate or tubular; lobes 4-5. Petals 4-5, inserted on the throat or bottom of the calyx-tube. Male flowers: Stamens 4-5, at the bottom of the calyx-tube, opposite as many scales or glands; filaments free or connate; anthers basi-fixed; ovary rudimentary or 0. Female flowers: Staminodes 4-5, opposite as many scales or glands; ovary stalked or subsessile; ovules numerous, attached to 3 parietal placentas; style 0 or 3-fid; stigmas 3. Fruit a loculicidal 3-valved capsule. Seeds numerous, arillate, flattened, usually pitted; funicle long; albumen fleshy; cotyledons foliaceous.—Species 60.—Palaeotropics.

A. cissampeloides Harms. is used medicinally in the Gold Coast, *A. kirkii* (Mast.) Engl. in Portuguese East Africa, *A. senensis* (Klotzsch.) Engl. in Southern Africa.

1. **Adenia palmata** Engl. in Engl. & Prantl Natürl. Pflanzenf. III, 6a (1893) 84.—*Modecca palmata* Lam. Encycl. Méth. IV. (1796) 209; Wight Ic. t. 201.—PLATE 441 (under *Modecca palmata*).

A large perennial herb becoming woody at the base; root large, fusiform; stems long, thickened at the nodes, terete, smooth and shining, mottled with purple, not much branched. Leaves membranous, broader than long, 10-12.5 by 15-18 cm., cordate, with 2 flat glands at the apex of the petiole and 1 at the base of each sinus in the divided leaves, usually very deeply palmately 5-lobed (rarely 3-lobed or undivided), glabrous and shining; lobes oblong-lanceolate, acute, entire; nerves and veins conspicuous; petioles 5 cm. long, grooved, glabrous. Flowers in 2 opposite cymes (usually of 3) on a long axillary peduncle which is produced into a long simple tendril. Male flowers: Calyx broadly campanulate, 1.3-1.6 cm. long, dilated at the base; lobes 5, ovate, acute. Petals linear-oblong, acute, ciliate, inserted at the base of the calyx-tube. Corona a ring of threads from

the calyx-tube just above the dilated portion. Stamens distant; filaments subulate, connate at the base; anthers linear-oblong. Ovary rudimentary. Female flowers: Calyx 6 mm. long, campanulate; lobes ovate, acute. Petals as in the male. Staminodes 5, erect, flat, strap-shaped, connate at the base into a membranous cup. Ovary shortly stalked, globose, smooth, tapering into 3 long styles; stigmas much divided, feathery. Fruit reaching 5 cm. diam., shortly stalked, globose, apiculate, smooth, orange-coloured, splitting into 3 fleshy valves, Seeds nearly 1.3 cm. diam. discoid, compressed, muriculate and pitted, each with a pulpy aril.

Distribution: N. Kanara.

The juice is used as a pectoral in Malabar.

The roots enter into the composition of most of the strengthening medicines.

In Ceylon, the juice of the roots and leaves is used externally for skin diseases. The fruit is considered poisonous and is said to have caused death.

Konkani: Undal—; *Malayalam:* Mutakku—; *Sinhalese:* Hondala, Potuhondala—; *Tagalog:* Binoyocboyoc—; *Telugu:* Modikka—.

PASSIFLORA Linn.

Twining shrubs. Leaves simple or palmilobed, usually with glands on the under surface and on the petiole; stipules thread-like or leafy. Flowers pedunculate; peduncles simple or cymose. Bracteoles 3, small, scattered. Calyx-tube fleshy, limb 5-lobed. Petals 5, springing from the throat of the calyx. Corona of one or more rows of fine threads springing from the throat of the calyx-tube and of one or more membranous folds arising lower down. Gynophore surrounded at the base by a shallow membranous cup or basilar corona; filaments 5, flat; anthers oblong, 2-celled, dorsifixed; pollen grains reticulate on the surface. Ovary 1-celled; styles 3, stigmas reniformi-capitate. Fruit baccate. Seeds arillate.—Species 275.—Chiefly American, a few in Asia and Australia, one in Madagascar.

1. A slender foetid-smelling climber .... 1. P. FOETIDA.
2. An herbaceous nearly glabrous vine .... 2. P. EDULIS

The genus is emetic and diuretic.

The following species are used medicinally in La Reunion— *P. alata* Ait., *P. caerulea* Linn., *P. foetida* Linn.—; in the West Indies *P. rubra* Linn.—; in Brazil—*P. alata* Ait., *P. albida* Ker., *P. edulis* Sims., *P. foetida* Linn., *P. incarnata* Linn., *P. maliformis* Linn., *P. sururuca* Vell.—.

1. **Passiflora foetida** Linn. Sp. Pl. (1753) 959.

A slender foetid-smelling climber with palmately-3-lobed leaves 3.8-6.3 cm. long, ciliate and denticulate with gland-tipped setaceous hairs, similar hairs also beneath and simple hairs above, stipules laciniate with gland-tipped segments. Flowers 2.5 cm., greenish, mostly solitary axillary, with an involucre of finely pinnatifid bracteoles with capillary glandular segments. Fruit like a small green gooseberry.

Distribution: Widely cultivated in India.

The leaves are applied on the head for giddiness and headache; a decoction is given in biliousness and asthma.

The fruit is used as an emetic.

In La Reunion, the leaves are considered emmenagogue; they are prescribed in hysteria.

In Brazil, the herb is used in the form of lotions or poultices for erysipelas, and skin diseases with inflammation.

Brazil: Murucuja do Estralo—; *Canarese:* Kukkiballi—; *French:* Marie gouju, Passiflore fétide—; *Malay:* K'rang Kraut, Lang buluh, Letop-letop, Timun dindang, Timun padang—; *Tamil:* Siruppunaikkali—; *Telugu:* Tellajumiki—.

2. **Passiflora edulis** Sims Bot. Mag. t. 1989.

An herbaceous, nearly glabrous vine, reaching a length of several metres, the stems terete. Leaves ovate in outline, 8-13 cm. long, deeply palmately 3-lobed, the lobes oblong, acuminate, margins serrate, the petioles 2-glandular at the apex. Flowers fragrant, about 4.5 cm. diam., solitary, the pedicels about 3 cm. long. Bracts 3, green, elliptic to obovate, irregularly toothed, glandular on the

margins. Sepals oblong, green, about 2 cm. long, spurred at the apex. Petals lanceolate, pale purplish, about as long as the sepals. Corona-filaments very numerous, in 3 series, white at the base, blue-purple above, often with white markings.

Distribution: Brazil.—Naturalized in tropical countries.

The pulp of the fruit is used in Brazil as a stimulant and tonic.

Brazil: Murucuja suspiro—.

CUCURBITACEAE.

Herbs or undershrubs usually climbing. Leaves alternate, petiolate, frequently cordate, simple, or palmately or pedately divided. Tendrils when present lateral, solitary, simple or divided, spirally twisted. Flowers monoecious or dioecious, yellow or white, solitary paniculate or racemose. Calyx-tube adnate to the ovary; limb rotate, campanulate or tubular, 5- (rarely 3-6-) lobed, imbricate. Petals as many as the calyx-lobes, inserted on the limb of the calyx, free or rarely gamopetalous, sometimes lobed or fimbriate, valvate or involute in bud. Stamens inserted at the mouth, or about the middle, or at the base of the calyx-tube, usually 3 (rarely 5); anthers free, cohering, or confluent into a capitulum, one usually 1-celled, the other two 2-celled, the cells flexuous or conduplicate, extrorsely dehiscent, the connective sometimes produced beyond the cells. Ovary inferior, or rarely free at the apex only, usually 3-carpellary; ovules usually many, horizontal, rarely few and pendulous; style 1 with 3 large stigmas (more rarely styles 2-3-4); placentæ usually 3, the edges of the carpellary leaves being often turned in so far that the ovary (even before fertilization) is spuriously 3-celled. Fruit usually a fleshy berry, indehiscent or dehiscing by valves or by a circumscissile lid. Seeds numerous, often packed in pulp or fibre; albumen 0.—Genera 90. Species 750. —Warmer parts of the globe, chiefly in the tropics.

A. Ovules horizontal (or pendulous). Female flowers usually solitary, never panicled. Leaves not divided into distinct leaflets
  I. Anther-cells conduplicate or sigmoid
    a. Corolla divided nearly or quite to the base into 5 petals
      1. Petals fimbriate at their margin
        Seeds many. Calyx-tube less than 7.5 cm. ...... TRICHOSANTHES.
      2. Petals entire
        aa. Calyx-tube of the male flower elongate; anthers usually included in the tube or nearly so
          α Seeds many, horizontal. Tendrils rarely divided .... GYMNOPETALUM.
          β Tendrils divided. Fruit very large. Petiole with 2 glands at apex .... LAGENARIA.
        bb. Calyx-tube of the male flowers short. Anthers usually exserted from the tube or nearly so
          α Male flowers partly in racemes. Fruit opening by a stopple .... LUFFA.
          β Flowers all solitary. Fruit very fleshy, indehiscent .... BENINCASA.
          γ Male flowers partly racemed. Tendrils simple .... MOMORDICA.
          δ Male flowers clustered or solitary. Tendrils simple .... CUCUMIS.
          ε Flowers all solitary. Tendrils 2-3-fid .... CITRULLUS.
    b. Corolla campanulate, divided half way down or thereabout
      1. Tendrils simple. Flowers white .... COCCINIA.
      2. Tendrils divided. Flowers yellow .... CUCURBITA.
  II. Anther-cells straight (or in BRYONOPSIS somewhat curved)
    a. Male and female pedicels 1-flowered, clustered Tendrils bifid .... BRYONOPSIS.
    b. Male flowers corymbose or subumbellate or racemed
      1. Fruit on a capillary peduncle. Connective produced MELOTHRIA.
      2. Fruit subsessile, beaked .... KEDROSTIS.
      3. Fruit circumscissile near the base .... CORALLOCARPUS.
      4. Ciliate bracts resembling stipules at base of the petiole .... BLASTANIA.
B. Ovules pendulous. Flowers small, the females in panicled or many-flowered racemes
  Fruit long, clavate. Leaves subentire .... ZANONIA.

The fruits are often laxative, sometimes very bitter and strongly emetic and cathartic. The roots are occasionally acrid and act as drastic purgatives. The seeds are more or less mucilaginous or oleaginous.

Among the products extracted may be mentioned: (1) resins and

resinoids—bryoresin, citrullin, elaterin, phytosterolin—; (2) glucosides—bryonin, colocynthin—; (3) alkaloids of unknown constitution.

OFFICIAL :—*Bryonia alba* Desfont.=*B. dioica* Jacq. & Brot. (Portugal).

Citrullus Colocynthis Schrader (Austria, Denmark, France, Great Britain, Holland, Hungary, Japan, Norway, Sweden); *C. Colocynthis* (Linne) Schrader (Germany, Switzerland, United States); *C. Colocynthis* (L.) Schrader=*Cucumis Colocynthis* Linn. (Italy).

Cucumis Colocynthis Linn.=*Citrullus Colocynthis* Arnott and Schrader (Portugal); *C. Melo* Linn. (Portugal); *C. sativus* Linn. (Portugal).

Cucurbita Citrullus Linn.=*Cucumis Citrullus* Seringe (Portugal); *C. lagenaria* Linn. var. *teres oblonga* Brot.=*Lagenaria vulgaris* var. *Cougourda* Seringe (Portugal); *C. maxima* Duch.= *C. Potiro* Pers. (Portugal); *C. Pepo* Duch. (France); *C. Pepo* Linn. (Portugal, United States).

Ecbalium Elaterium (Linne) A. Richard (United States).

Momordica Elaterium Linn.=*Ecballium Elaterium* Rich. (Portugal).

TRICHOSANTHES Linn.

Scandent herbs. Leaves entire or 3-9-lobed, denticulate; tendrils simple or 2-5-fid. Flowers dioecious (rarely monoecious), white. Male flowers usually racemose (rarely solitary), often bracteolate. Calyx-tube cylindric, dilated above, 5-lobed. Corolla 5-fid nearly to the base; lobes long, fimbriate. Stamens 3, inserted in the calyx-tube; filaments very short; anthers almost included, usually connate, one 1-celled, the others 2-celled, the cells conduplicate, connective narrow, not produced. Rudimentary ovaries 3, filiform. Female flowers solitary. Calyx and corolla as in the male. Staminodes 0. Ovary inferior, ovoid or fusiform, 1-celled, 3-placentiferous; ovules very many, horizontal or semi-pendulous; style slender; stigmas 3, entire or bifid. Fruit fleshy, globose, ovoid or fusiform, indehiscent,

many-seeded, usually smooth and glabrous. Seeds packed in pulp, ellipsoid, sometimes angular, usually margined.—Species 42.—Indo-Malaya.

A. Bracts of the male raceme large, sheathing the flowers from a broad base
   1. Climbing often 9 m. Leaves not at all hairy beneath, usually glabrous or less commonly scabrous on the nerves, often with several large glands near the apex of the petiole .... 1. *T. palmata.*
   2. Rambling extensively. Leaves usually glabrous beneath or less commonly scabrous with scattered bristles ...... 7. *T. wallichiana.*
   3. An extensive climber. Leaves hairy beneath .... 2. *T. cordata.*

B. Bracts of the male raceme absent or minute
   1. Leaves cordate, oblong-acute. Petiole scabrous, woolly .. 3. *T. dioica.*
   2. Leaves cordate, oblong-acute. Petiole glabrous .... 4. *T. nervifolia.*
   3. Leaves cordate, subreniform, 5- (3-7-) lobed or 5-angular. Fruit 2.5-7.5 cm., ovoid-conical .... 5. *T. cucumerina.*
   4. Leaves cordate, subreniform. Fruit elongate cylindric, sometimes contorted .... 6. *T. anguina.*

The fruit is reckoned anthelmintic; the seeds bitter and astringent, sometimes emetic and purgative.

The following species are used mdicinally in China *T. cucumerina* Linn., *T. japonica* Regel, *T. multiloba* Miq., *T. palmata* Roxb.—; in Indo China—*T. anguina* Linn., *T. bracteata* Voigt., *T. cucumerina* Linn., *T. tricuspida* Bl.—; in the Philippine Islands—*T. anguina* Linn., *T. cucumerina* Linn., *T. palmata* Roxb.—; in Java—*T. villosa* Blum.—; in Malaya—*T. multiloba* Miq.—; in the West Indies—*T. amara* Linn.—; in Guiana—*T. cucumerina* Linn.

T. wallichiana Wight is used as a poison in Kelantan, Malay Peninsula.

1. **Trichosanthes palmata** Roxb. Fl. Ind. III (1832) 704; Wight Ill. tt. 104, 105.—Plate 442B.

Climbing often to a height of 9 m.; stems robust, woody below, branched, grooved, the older light grey, with scabrous spots, the younger smooth, green. Tendrils 2-, more commonly 3- cleft. Leaves 6.3-12.5 cm. long and about as broad as long, variable, usually palmately 3-5-lobed to about the middle (more or less), dark green above, paler beneath, frequently with dark coloured circular glands scattered along the lower side, glabrous, often scabrous with

small scales above and on the nerves beneath, base cordate; lobes usually ovate-oblong, acute, more or less dentate or serrate; petioles 2.5-7.5 cm. long, striate, puberulous or at length glabrous. Male flowers in axillary 5-10-flowered racemes 15-23 cm. long (rarely solitary); pedicels thick, erect, very short; bracts 2.5 cm. long and more, broadly ovate, pale green, many-nerved, fringed, dotted with dark green glandular spots. Calyx-tube 3.8 cm. long, pubescent, longitudinally striate; teeth lanceolate, erect or spreading, laciniate. Petals 2.5 cm. long, wedge-shaped, fringed, exceeding the calyx-teeth. Filaments slightly villous. Female flowers axillary, solitary; peduncles less than 2.5 cm. long. Fruit 3.8-5 cm. diam., globose, red when ripe, streaked with 10 orange streaks; pericarp thick. Seeds numerous, 1-1.3 cm. long, ellipsoid, smooth, slightly attenuated at the base, not margined.

Distribution: Throughout India to Ceylon, ascending to 5,000 ft. on the Himalaya. —Malaya, China, Japan, N. Australia.

The fruit is useful in asthma, earache, and ozoena (Ayurveda).

The fruit is bitter, carminative, purgative, abortifacient; lessens inflammation; cures hemicrania, weakness of limbs, heat of brains, ophthalmia, leprosy; used in epilepsy, rheumatism; gargle good for toothache; the smoke causes hæmatemesis.—The seeds are emetic, purgative (Yunani).

The fruit pounded and well mixed with warm cocoanut oil, forms a valuable application to sores under the ears and nostrils. The juice of the fruit or the root-bark, boiled with gingelly oil, is used with good effect as a bath oil, for the relief of long-standing or recurrent attacks of headache.

In Bombay, the fruit is smoked as a remedy for asthma. The root, with an equal portion of Colocynth root, is rubbed into a paste and applied to carbuncles; combined with equal portions of the three myrobalans and turmeric, it affords an infusion which is flavoured with honey and given in gonorrhœa.

The fruit and the root boiled with mustard oil are used for headache by the Mundas of Chota Nagpur.

The fruit of this plant is a violent hydragogue cathartic. The

oil obtained by boiling it in gingelly or cocoanut oil, when applied to the scalp, is said to cure hemicrania and ozoena. The oil is dropped into the ear in cases of otorrhœa. In my private practice I have found this oil useful in curing hemicrania (Koman).

Arabic: Ambaghol, Hanzaleahmar—; *Bengal:* Makal—; *Bombay:* Kaundal—; *Canarese:* Avagudehannu—; *Chinese:* Pai Yao Tzu—; *Deccan:* Gudapandu, Koundel, Lalindravam, Lalindrayan—; *Garhwal:* Ilaru, Indarain—; *Gujerati:* Ratanindravanan—; *Hasada:* Kaupudki—; *Hindi:* Indrayan, Lalindrayan, Mahakal, Makal—; *Konkani:* Komdol—; *Kumaon:* Indrayan—; *Malayalam:* Kakatonti—; *Marathi:* Kaundal, Kavandala, Mukal—; *Naguri:* Kaubuti, Kaubutuki, Marangkaubutki—; *North-Western Provinces:* Indrayan, Lalindrayan, Makhal, Palwal, Parwar—; *Persian:* Hanzalesurkh, Koshta—; *Ranikhet:* Indarain—; *Sanskrit:* Mahakala—; *Sinhalese:* Tittahondala—; *Tamil:* Ankorattai, Korattai, Shavaripalam—; *Telugu:* Abuba, Abuva, Aguba, Avaduta, Avaguda, Avagudapandu, Donda, Kakidonda—; *Urdu:* Indrayan—.

2. **Trichosanthes cordata** Roxb. Fl. Ind. III (1832) 703. Plate 442A.

An extensive climber, with large tuberous roots and stout branching stems; tendrils usually very stout, 3-fid. Leaves 15-20 cm., entire or obscurely angular, broadly ovate-cordate, acute or shortly acuminate, dentate-serrate, dark green above, and with short scattered hairs on both surfaces; petioles 5-10 cm., stout. Male racemes few-flowered; bracts large, elongate, sheathing at the base, obovate, entire, pubescent. Calyx-tube 3.8 cm., hairy; lobes acuminate, denticulate. Fruit as in T. palmata.

Distribution: Upper Gangetic Plain, along the base of the Himalaya from Nepal eastwards, Bengal, Burma.

The roots are used as a tonic.

In Decca, the root, dried and reduced to powder, is given in doses of 10 grains in enlargements of the spleen, liver and abdominal viscera. The fresh root, mixed with oil, forms a common application for leprous ulcers.

The dried flowers are given as a stimulant in Patna.

Bengal: Bhakhumba, Bhumikumara, Bhumikumra, Patol—.

3. **Trichosanthes dioica** Roxb. Hort. Beng. (1814) 70; Fl. Ind. III (1832) 701.—PLATE 443.

Stems slender, extensively climbing, more or less scabrous and woolly; tendrils 2-4-fid. Leaves 7.5 by 5 cm., ovate-oblong, cordate, acute, sinuate-dentate, not lobed, rigid, rough on both surfaces; petiole 2 cm. Flowers dioecious. Male flowers not racemed, woolly outside. Calyx-tube 4.5 cm., narrow; teeth linear, erect. Anthers free. Fruit 5-9 cm., oblong or nearly spherical acute, smooth, orange-red when ripe. Seeds ½-ellipsoid, compressed, corrugated on the margin.

Distribution: Throughout the plains of N. India, extending to Assam and E. Bengal.

The plant cures bronchitis.—The root is cathartic.—The leaves are antipyretic, anthelmintic, aphrodisiac; cure biliousness, bronchitis.—The fruit is sweet, oleaginous, stomachic, cardiotonic, fattening, appetiser, digestible, anthelmintic; cures "tridosha", cough, blood diseases (Ayurveda).

The plant is alterative, tonic; useful in heat troubles, obstinate fevers, boils.—The root is cathartic.—The leaves are anthelmintic; cure boils, biliousness.—The flower is tonic and aphrodisiac.—The ripe fruit is sour, sweet; tonic, aphrodisiac, expectorant; removes blood impurities (Yunani).

In Gujarat, the fruit is used as a remedy for spermatorrhœa.

The fresh juice of the unripe fruit is often used as a cooling and laxative adjunct to some alterative medicines. In bilious fever. a decoction of *patola* leaves and coriander in equal parts, is given as a febrifuge and laxative.

The root is a hydragogue cathartic. It has also been described as a febrifuge and tonic.

The fruit in combination with other drugs is prescribed in snake-bite (Sushruta, Vaidyavinoda) and scorpion-sting (Charaka, Sushruta).

The fruit is not an antidote to snake-venom (Mhaskar and Caius) or to scorpion-venom (Caius and Mhaskar).

Bengal: Potol—; *Gujerat:* Potala—; *Hindi:* Palval, Parvar—;

5. **Trichosanthes cucumerina** Linn. Sp. Pl. (1753) 1008. PLATE 444B.

Annual, monoecious; stems 3.6-4.5 m. long, slender, furrowed, slightly hairy or subglabrous, leafy. Tendrils 2-3- (usually 3-) fid. Leaves 5-12.5 cm. long, usually a little broader than long, orbicular-reniform or broadly ovate, distantly denticulate, more or less deeply 5- (rarely 3-7-) lobed, the lobes broad, acute, glabrous or nearly so above, more or less pubescent, or, when old sometimes scabrid beneath, base deeply cordate, the sinus often subrectangular, petioles 2.5-7.5 cm. long, striate, pubescent. Male flowers in axillary racemes, with sometimes a solitary male flower from the same axil as the raceme; peduncles of the racemes 5-15 cm. long, slender, striate, bearing 8-15 flowers near the apex; pedicels puberulous, 8-20 mm. long, bracts 0. Calyx-tube dilated at the apex, 2-2.5 cm. long, about 3 mm. wide at the mouth; teeth short, acutely triangular. Petals white, 10 mm. long, lanceolate-oblong, laciniate at the apex. Female flowers axillary, solitary, or occasionally a female flower in the same axil as the male peduncle; peduncles of female flowers 3-16 mm. long. Fruit 2.5-7.5 cm. long, ovoid-fusiform, tapering at both ends and with a long sharp beak, green and striped with white when immature, scarlet when ripe; pericarp thin. Seeds semi-ellipsoid, compressed, rugulose, surrounded with red pulp.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Malaya, N. Australia.

The plant is used in bronchitis.—The root is cathartic; cures bronchitis, headache, boils.—The leaves are good for biliousness.—The fruit is bitter, hot, pungent; laxative, antipyretic, alexiteric, stomachic; allays thirst, asthma; cures biliousness, bronchitis, itching, leucoderma, diseases of the blood, burning sensation, leprosy, ulcers, erysipelas, eye diseases, "tridosha".—The oil cures bronchitis (Ayurveda).

The plant is a cardiac tonic, general tonic, alterative, antipyretic, useful for boils and intestinal worms.

In Bombay, the plant has a reputation as a febrifuge; it is given in decoction with ginger, chiretta and honey. In the Konkan, the

leaf juice is rubbed over the liver or even the whole body in remittent fevers.

The seeds are reputed good in disorder of the stomach on the Malabar Coast. The unripe fruit is very bitter; the tender shoots and dried capsules are bitter and aperient; they are given in infusion. In decoction with sugar, they are given to assist digestion. The seeds are antifebrile and anthelmintic. The juice of the leaves expressed is emetic and that of the root, drunk in quantity of 2 oz. for a dose, is very purgative. The stalk in decoction is expectorant.

In Ceylon, the root decoction is taken to expel worms; the leaves and the stems are used in decoction for bilious disorders, cutaneous diseases, and as an emmenagogue.

The fruit is very bitter and is considered a drastic purgative and emetic in Indo China.

In French Guiana, the fruit is considered anthelmintic, cathartic, emetic.

The juice of the leaf has emetic properties. The juice of the root is a strong gastro-intestinal irritant; a decoction of the root is said to possess antiperiodic properties. This decoction was administered in doses of one ounce three times a day to several cases of malarial fever, but the result was not satisfactory (Koman).

Bengal: Banchichanga, Banpatol, Ranachapadavali—; *Bombay:* Janglipadavala, Kadupadavala, Pudoli, Ranparul—; *Burma:* Thabhwotkha, Topelenmoye—; *Canarese:* Bettadapadavala, Kiripodla—; *French Guiana:* Anguine amĕre—; *Gujerati:* Kadvipadvala, Kadvipatola, Padvala, Patola—; *Hindi:* Janglichichonda—; *Indo China:* Bat bat trau, Dua nui—; *Kumaon:* Janglichachinda—; *Malayalam:* Kaippampatolam, Katupatolam, Patavalam, Pepatolam—; *Marathi:* Janglipadavala, Jangliparela, Kadupadavala, Perula, Ranachapadavali, Ranpadavala—; *Mundari:* Birkaetha, Kaubutuki—; *North-Western Provinces:* Banpatol, Janglichichinda, Janglichichonda, Kandori, Patol—; *Porebunder:* Kadvipatar—; *Punjab:* Gwalkakri, Mohakri—; *Sanskrit:* Amritaphala, Bijagarbha, Jvaranashana, Jyotsna, Kachhughni, Kachhura, Kadupatola, Karkashachhada, Karkashadala, Kasabhanjana, Kasamaradana, Katuka, Katuphala, Kulaja, Kulaka, Kushthaha, Kushtari, Lataphala, Nagaphala,

Pancharajiphala, Panduka, Panduphala, Panjura, Patola, Patri, Pratika, Rajapatola, Rajimana, Rajiphala, Tiktabhadraka, Tiktaka, Tiktapatola, Tiktottama, Vajimana, Varatikta—; *Sinhalese:* Dummella—; *Tamil:* Kattuppeyppudal, Pudal, Peyppudal—; *Telugu:* Adavipolla, Chayudpottah, Chetipotla, Chyapotla, Patolamu, Patolas—; *Urdu:* Patol—.

6. **Trichosanthes anguina** Linn. Sp. Pl. (1753) 1008.—Plate 445.

This resembles *T. cucumerina* almost exactly except as regards the fruit, which differs chiefly in beirg very variable both as to shape and size. It varies from 0.3-0.9 m. in length and is often much contorted. When young it is green striped with white, changing to a bright orange colour when ripe.

Distribution: Extensively cultivated throughout the hotter parts of India and China.

The fruit is tonic; cures "vata", thirst, biliousness (Ayurveda).

The root and seeds are anthelmintic and antidiarrhœal; used for biliousness and in syphilis.—The fruit is tasteless; lessens thirst and increases appetite; tonic and stomachic (Yunani).

The seeds are considered cooling.

In Indo China, the plant is used as a purgative and vermifuge. The fruit is considered purgative, emetic, and anthelmintic in the Philippine Islands; the stupose reticular material round the seeds is given in the form of an aqueous infusion.

Bengal: Chichinga—; *Bombay:* Padavala, Padval, Pandolu, Parula, Parvar—; *Burma:* Pai-len-mwae—; *Canarese:* Padavala—; *Central Provinces:* Pudola—; *English:* Snake Gourd—; *Gujerati:* Padavli—; *Hasada:* Kaeta—; *Hindi:* Chachenda, Chachinga, Purwul—; *Indo China:* Muop ho, Muop sac, Qua lau—; *Konkani:* Podolem—; *Kumaon:* Chachinda—; *La Reunion:* Patole—; *Madras:* Pudel—; *Marathi:* Padual, Tarakankadi—; *Mundari:* Kaetha, Lilkaetha, Pundikaetha—; *Naguri:* Kaetha—; *North-Western Provinces:* Jhajhinda—; *Oudh:* Chachinda, Chachinga—; *Pampangan:* Cucubitan, Curagda, Pocotpocot, Pucopucot—; *Portuguese:* Patola—; *Punjab:* Chichinda, Galartori, Pandol—; *Sanskrit:*

Ahiphala, Brihatphala, Chichinda, Chichunda, Chinakarkatika, Dirghaphala, Grihakulaka, Shvetaraji, Sudirgha, Veshmakula—; *Sind:* Kadotri, Pandol, Rebhri—; *Tagalog:* Cucubitan, Halahala, Hothot, Pacupis Salagsalag, Salimpocot—; *Telugu:* Lingapotla, Potla—; *Uraon:* Kaetha—; *Urdu:* Chachenda—; *Uriya:* Chhachhindara—; *Visayan:* Cucubitan, Curagda, Pocotpocot, Pucopucot—.

7. **Trichosanthes wallichiana** Wight Ann. Mag. Nat. Hist. VII, 70.—*T. multiloba* Clarke in Hook. f. Fl. Brit. Ind. II, 607 (non Miq.).

Leaves membranous suborbicular divided half way down into 3 to 5 oblong or triangular acute lobes sparsely toothed, base cordate, glabrous, 7.5-18 cm. long and wide. Male peduncles stout, lengthening to 20 cm. Bracts oblong-ovate, edges laciniate. Calyx-tube glabrous, teeth entire lanceolate-acuminate. Petals obovate laciniate. Female flowers solitary. Fruit ellipsoid obtuse, red, 5-10 cm. long.

Distribution: Sikkim, Khasia Mts., 2,000—6,000 ft., Malay Peninsula.—Bhamo, Japan.

It is used as a poison in Kelantan by pounding the very bitter ripe fruit and mixing it with opium.

Malay: Akar balistue, Akar timun gagak, Mentimun dendang, Pedendang—.

Gymnopetalum Arn.

Usually creeping herbs, slender. Leaves entire or deeply 3-5-lobed. Flowers white, rather large. Male peduncles 2 from each axil, one 1-flowered, the other racemose. Bracts on racemes large, lanceolate incised or small. Females 1-flowered. Male: Calyx-tube long, lobes 5, lanceolate. Petals 5 not fimbriate. Stamens 3, anthers conduplicate. Female: Ovary oblong; style long. Stigmas 3. Fruit ovate, oblong, acute at both ends. Seeds ellipsoid, margined.—Species 6.—Indo China, Malaya.

G. cochinchinense Kurz. is used medicinally in Indo China.

1. **Gymnopetalum cochinchinense** Kurz. Journ. As. Soc. Beng. XILVI, 57.

Stem scabrid, hairy. Leaves reniform to triangular, 5-angled or lobed half way, lobes triangular acute, edges crenate dentate, base deep cordate, scabrid, 5-10 cm. long, 5-9 cm. wide; petioles scabrid pubescent, 2.5-3.8 cm. long. Male peduncles 7.5 cm. long. Flowers racemose. Bracts large incised serrate, 2 cm. long. Calyx-tube subcylindric, villous, mouth with deflexed hairs. Petals ovate oblong, 13 mm. long. Female peduncles short. Fruit 5 cm. long, 2 cm. through, 10-ribbed, beaked, orange.

Distribution: Malay Peninsula, Indo-Malaya, China.

This plant enters into the composition of a special drug given to women in labour.

Among the Mundas of Chota Nagpur the tuberous root, pounded and mixed with hot water, is rubbed on the body in body-ache, and atrophy of limbs.

Hasada: Kaupudki—; *Indo China:* Ban can, Day bac bac, Day qua, Mac tinge—; *Malay:* Sipam—; *Naguri:* Huringkaubutuki, Kaubuti, Kaubutuki—.

LAGENARIA Seringe.

Species 1.—Palaeotropics.

L. vulgaris Ser. is used medicinally in Europe, China, the Hawaiian Islands, the Philippine Islands, Brazil, Guiana and the Gold Coast.

1. **Lagenaria vulgaris** Ser. in Mem. Soc. Phys. Geneve III, I (1825) 25.—*Cucurbita Lagenaria* Linn.; Roxb. Fl. Ind. III (1832) 718.—PLATE 446.

A large softly pubescent climbing or trailing herb, with stout 5-angled stems; tendrils 2-fid. Leaves often 15 cm. diam., ovate or orbicular, cordate, dentate, 5-angular or 5-lobed, hairy on both surfaces; petiole long with 2 glands at its apex. Flowers large, white, solitary, monoecious or dioecious, the males long—, the females short-peduncled. Male: Calyx-tube funnel-shaped, subcampanulate; teeth 5, narrow. Petals 5, free, obovate, 2.5-5 cm. long, crumpled, hairy on both sides. Stamens 3; anthers connate, included,

one 1-celled, two 2-celled, cells conduplicate, rudiment of ovary 0. Female: Calyx and corolla as in the male. Ovary oblong, softly pubescent; style short, with 3 bifid stigmatic lobes; ovules many, horizontal; placentæ 3, vertical. Fruit large, usually bottle- or dumb-bell-shaped, ultimately thick membranous or almost woody, indehiscent, polymorphous. Seeds very many, 1.6-2 cm., white, horizontal, compressed, with a marginal groove, smooth.

Distribution: Said to be indigenous in India, the Moluccas and in Abyssinia.

1. *Sweet-fruit variety:*—The stem is sweet, laxative; cures biliousness; causes bronchitis and flatulence. The leaves are laxative.—The fruit is sweet, oleagenous; cardiotonic, general tonic, aphrodisiac, laxative, cooling, fattening; increases " vata "; improves taste; cures leucorrhœa and biliousness; wholesome to the foetus—. 2. *Bitter-fruit variety:*—The leaves are diuretic, antibilious; useful in leucorrhœa, vaginal and uterine complaints, earache.—The fruit is bitter, hot, pungent; emetic, alexiteric, cooling, cardiotonic, antibilious; cures asthma, " vata ", bronchitis, inflammations, ulcers, pains (Ayurveda).

1. *Sweet-fruit variety:*—The fruit is indigestible; tonic to the liver, vulnerary, antiperiodic; cures blood diseases of persons with a hot constitution; cures muscular pain and dry cough.—The rind is good for piles.—The ash of the rind is styptic and vulnerary.—The seeds are good for hot constitutions.—2. *Bitter-fruit variety:*—The roots diminish inflammation.—The flowers are cooling; good in ophthalmia and toothache; cause hæmoptysis.—The fruit is very bitter; good in bronchitis.—The seeds are emetic.—3. *Long-fruit variety:*—The fruit is sweet, diuretic, antipyretic, antibilious.—The seeds are fattening, diuretic, cooling, tonic to the brain; cure cough, fever, scalding of urine, earache; lessen inflammation (Yunani).

The seeds of this plant yield an oil which is used as an application for headache. The flesh of the fruit is considered diuretic, refrigerant, and antibilious. It is also sometimes made into a poultice; when fresh, it is bitter and purgative, and is applied over the shaved head in delirium. In the Punjab, the pulp is applied to the soles, in " burning of the feet."

The pulp of the bitter variety is powerfully emetic and purgative. In Bombay, it is used in native practice as a purgative; it is also applied exeternally as a poultice. A decoction of the leaves mixed with sugar is given in jaundice.

In the Gold Coast, the leaves are sometimes ground and used as an enema.

In Guiana, the juice of the plant is considered a powerful cathartic. The seeds are prescribed in dropsy, and are also used as a tæniacide.

The fruit of the bitter variety is prescribed in combination with other drugs for the treatment of scorpion-sting (Charaka). The fruit is not an antidote to scorpion-venom (Caius and Mhaskar).

Annam: Bau nam—; *Arabic:* Karehulmar—; *Assam:* Bogalao—; *Bengal:* Kodulau, Tiktalau—; *Bijnor:* Golkaddu—; *Brazil:* Abobara do Carneiro, Cabaco, Cocombro—; *Burma:* Businswai—; *Chinese:* Hu Lu, K'u Hu, Pai, P'iao—; *English:* Bottle Gourd, Calabash—; *Ewe:* Adangga, Tsiqui—; *Fanti:* Bairntua—; *French:* Calebasse, Calebasse d'Europe, Calebasse d'herbe, Congourde, Courge, Courge ă bouteilles, Gourde de pélerin—; *French Guiana:* Calebasseterre—; *Ga:* Akpaki, Bentoa, Tor, Tshene—; *Gujerati:* Dudhi, Dudio, Kadvitumbadi, Tumada—; *Hausa:* Duma—; *Hindi:* Alkaddu, Golkaddu, Kaddu, Kadutumbari, Kadutumbi, Kashiphal, Lau, Lauka, Lauki, Mithitumbi, Titalau, Tumri—; *Hova:* Voatavomanta—; *Indo China:* Bau nam, Ho lo—; *Kathiawar:* Dudhiyun, Dudhlun—; *Konkani:* Dudi, Dudio, Mardudi—; *Krobo:* Daka, Kpaku, Tor, Tortortsho, Tshiming—; *Kumaon:* Kauka, Tumri—; *Languedoc:* Congourble, Cougourde, Cougourdo, Cougourlo, Couis, Courjeto, Courjo, Gourdo—; *Malayalam:* Bellashora—; *Mandingo:* Mirango—; *Manjia:* Ndopote, Ndopu—; *Marathi:* Bhopla, Dudhya, Kadubhopla—; *Mundari:* Birsuku, Kenderasuku, Kendrasuku, Tumbasuku—; *Naga:* Mekuri—; *Naguri:* Kaduasuku—; *Nepal:* Konkra, Phusi—; *North-Western Provinces:* Kaddu, Lau, Lauki—; *Persian:* Kaddushirin, Kadutalkha—; *Portuguese:* Abobora branca, Abobora carneira, Aboboreira, Abobreira, Cabaca, Cabaceira, Calabaca, Colombro—; *Punjab:* Golkaddu, Kabulikaddu, Keddi, Lauki, Tumba—; *Sakalave:* Voam-

bahy—; *Sanak:* Alava—; *Sanskrit:* Alabu, Brihatphala, Dantabija, Ikshavaku, Katukalabu, Katutiktaka, Katutumbi, Katutumbini, Kshatriyavira, Labuka, Lamba, Mahaphala, Nripatmaja, Phalini, Pindaphala, Rajputri, Tiktaka, Tiktatumbi, Tumba, Tumbaka, Tumbi—; *Santal:* Kadu—; *Sind:* Hurreakadu, Irao, Kaddu—; *Sinhalese:* Diyalabu—; *Spanish:* Calabaza vinatera—; *Tagalog:* Opo, Upo—; *Tamil:* Shorakkai—; *Telugu:* Alaburu, Anapachettu, Anugakaya, Gubbakaya, Kundanuga, Nelanuga, Sorakaya—; *Twi:* Apakyi, Apakyiwa, Apairbairntutu, Bairntoa, Kora, Korawa, Toa—; *Urdu:* Kadugol, Tumbari—; *Visayan:* Calubay, Sicay—.

LUFFA (Tourn.) Linn.

Annual herbs. Tendrils 2-many-fid. Leaves 5-7-lobed (rarely subentire); petiole without glands at the apex. Flowers monoecious (rarely dioecious), rather large, yellow or white, males and females often from the same axil. Male flowers racemose. Calyx-tube campanulate or turbinate; lobes 5, triangular or lanceolate. Petals 5, free, spreading, obovate or obcordate. Stamens 3 (rarely 5), inserted on the calyx-tube; filaments free or connate; anthers exserted, free, one 1-celled, the others 2-celled, the cells sigmoid, often on the margin of a broad connective. Rudimentary ovary glanduliform or 0. Female flowers solitary. Calyx-tube produced beyond the ovary; lobes as in the male. Corolla as in the male. Staminodes usually 3, thick. Ovary elongate, sulcate, angled or cylindric, 3-placentiferous; ovules numerous, horizontal; style columnar; stigma 3-lobed. Fruit dry, oblong or cylindric (not spherical), acutely ribbed or terete, smooth or echinate, fibrous within, 3-celled, terminated by the persistent style, usually circumscissile near the apex. Seeds many, oblong, compressed.—Species 7.—Tropics.

A. Stamens 5
  Seeds winged, usually smooth .... 1. *L. aegyptiaca.*

B. Stamens 3
  1. Fruit 10-ribbed. Seeds rugose, wingless .... 2. *L. acutangula.*
  2. Fruit echinate. Seeds slightly verucose, wingless ...... 3. *L. echinata.*

The fruit and ripe seeds are violent cathartics and emetics.

L. aegyptiaca Mill. is used medicinally in China, Indo China, the Philippine Islands, Brazil and Guiana; *L. acutangula* Roxb., *L. operculata* (Linn.) Cogn., and *L. purgans* Mart. are also used in Brazil; *L. sphaerica* Sond. in South Africa; *L. acutangula* Roxb., *L. acutangula* var. *amara* Clarke, and *L. aegyptiaca* Mill. in Cambodia.

1. **Luffa aegyptiaca** Mill. Dict. ed. 8 (1768)—*L. pentandra* Roxb. Hort. Beng. (1814) 70; Wight Ic. t. 499.—PLATE 447.

Monoecious, climbing to a considerable height; stems stout, 5-angled, twisted, glabrous or slightly pubescent, often scabrous at the angles. Tendrils usually 3-fid. Leaves orbicular-reniform in outline, 10-20 cm. long, often broader than long, palmately 5- (rarely 7-) lobed, the lobes acute or acuminate, lobulate and distantly denticulate, both surfaces finely scabrous. Punctate, glabrous except the pubescent nerves beneath, base deeply cordate; petioles 2.5-10 cm. long, angular, slightly scabrous. Male flowers in axillary 4-20-flowered racemes, usually crowded near the top of the raceme; peduncles 10-15 cm. long; pedicels 6-13 mm. long, pubescent, articulated near the apex, each bearing a small lanceolate glandular bract at or, more commonly, a little above its base; buds ovoid, pointed. Calyx pubescent 1.9 cm. long; lobes lanceolate, acute, 1.3 cm. long. Petals spreading, 2.5 cm. long, obovate-oblong, yellow with green veins. Stamens 5, distinct. Female flowers solitary, usually from the same axils as the males; peduncles stout, 2.5-7.5 cm. long. Staminodes usually 5. Ovary cylindric-oblong, glabrous or pubescent. Fruit 12.5-30 cm. long, cylindric or somewhat trigonous, blunt at the end, marked with longitudinal lines. Seeds black or grey, 10 by 6 mm., much compressed, narrowly winged, smooth or slightly tuberculate.

Distribution: Cultivated throughout the greater part of India, as well as in Africa and America.—Believed to be indigenous in India, in the Indian Archipelago and N. Australia.

The fruit is oleagenous, laxative; removes "vata" and biliousness; useful in leprosy (Ayurveda).

The fruit is of three kinds; bad taste; expectorant, excellent tonic; cures biliousness, spleen diseases, leprosy, piles, fever, hæma-

turia, syphilis, bronchitis; one of the three kinds is also purgative (Yunani).

The seeds are emetic and cathartic.

In Indo China, the fruit is prescribed as a lactagogue. In Cambodia it is mostly used as a diuretic.

In Guiana, the young fruit is applied to tumours as a poultice.

The seeds yield an oil which has been examined chemically (Agricultural Ledger; 1911-12).

Arabic: Luff, Luffa—; *Assam:* Bhatkakrel, Bhatkerela, Bhol—; *Bengal:* Dhundul, Dundul, Hastighasha—; *Bombay:* Ghosali, Gonsali, Parosi, Parula, Turi—; *Brazil:* Bucha, Bucha dos Paulistas, Fructa dos paulistas, Luffa—; *Burma:* Thabwot, Thapwotkha—; *Cambodia:* Ronung prahen—; *Central Provinces:* Dilpasaud, Teldoaka—; *Ceylon:* Loofah—; *Chinese:* Szu Kua—; *English:* Gourd Towel, Sponge Gourd, Vegetable Sponge, Washrag Sponge—; *Ewe:* Gbeklor, Treklornu, Yakutsha—; *French:* Courge torchon, Eponge végétale, Liane torchon—; *Ga:* Blorfo kotsha—; *Gold Coast:* Loofah—; *Gujarat:* Galaka, Martigonsali, Turia—; *Hasada:* Doro—; *Hausa:* Soso—; *Hindi:* Ghiatarui, Nenua, Purula—; *Hova:* Sosety, Sosoety, Sotisoty—; *Indo China:* Muop, Ty qua—; *Konkani:* Porgonsali, Porgousali—; *Kumaon:* Dhandal, Ghiyataroi, Tarod, Turai—; *Madras:* Tureippirku—; *Malinke:* Saradion—; *Marathi:* Ghadaghosali, Ghosali, Paroshi—; *Naguri:* Dodo, Ghonggora, Gonggora, Gungga, Konggar—; *Nepal:* Palo—; *North-Western Provinces:* Ghiyataroi, Ghiyatori—; *Persian:* Khujar—; *Portuguese India:* Fructa cota—; *Punjab:* Ghiatori, Ghigandoli, Ghiturai—; *Sadani:* Konggar—; *Sanskrit:* Aibhi, Brihatkoshataki, Dhamargava, Dirghapatolika, Ghoshaka, Hastighosha, Hastikoshataki, Hastiparna, Mahakoshataki, Mahaphala, Mahapushpa, Rajakoshataki, Sapitaka—; *Sind:* Liasada, Turi—; *Sinhalese:* Neyangnattakolu—; *Sudan:* Niabesse—; *Tagalog:* Patola—; *Tamil:* Pichukku, Pikku—; *Telugu:* Guttibira, Netibira, Nunebira—; *Twi:* Bororfo saporw—; *Urdu:* Turi—; *Visayan:* Patola—.

2. **Luffa acutangula** Roxb. Hort. Beng. (1814) 70.—Plate 449.

Monoecious, climbing to a considerable height; stems 5-angled, glabrous, with sharp angles which are often scabrid. Tendrils usually 3-fid. Leaves orbicular in outline, pale green, 15-20 cm. long and broad, palmately 5-7-angled or sublobate, scabrid on both sides, base cordate; nerves and veins prominent beneath; petioles 5-12.5 cm. long, angular, scabrid. Male flowers in axillary 12-20-flowered racemes 10-15 cm. long. Calyx pubescent, 1.3 cm. long; lobes lanceolate, 1 cm. long. Petals 2 cm. long, spreading, obovate, yellow with green hairy veins. Stamens 3. Female flowers solitary, in the same axils as the males, peduncles 5-10 cm. long. Ovary strongly ribbed. Fruit 15-30 cm. long, clavate-oblong, tapering towards the base, very obtuse, smooth, longitudinally ribbed (almost winged) with 10 sharp angles. Seeds 13 by 6-8 mm., ovoid-oblong, much compressed, slightly corrugated on the sides, not winged, black.

Distribution: Considered to be indigenous in India and in the Malay Archipelago. Cultivated throughout the greater part of India.

The fruit is sweet, oleagenous, cooling; anthelmintic, stomachic, antipyretic; cures biliousness, asthma, bronchitis; causes "kapha" and flatulence.—The leaves are stomachic, antibilious, antipyretic; cure bronchitis (Ayurveda).

The medicinal properties are the same as those of *L. aegyptiaca* (Yunani).

The seeds possess purgative and emetic properties and also yield an oil.

The pounded leaves are applied locally to splenitis, hæmorrhoids, and leprosy. The juice of the fresh leaves is dropped into the eyes of children in granular conjunctivitis, also to prevent the lids adhering at night from excessive meibomian secretion. In Cambodia, the pounded leaves are applied to ringworm.

The fruit in combination with other drugs is prescribed as an antidote to snake-venom (Vagbhata). The juice of the leaves is applied to the part bitten.

The fruit is useless in the symptomatic treatment of snake-bite. The leaves are also useless as an external application (Mhaskar and Caius).

Banda: Moeke senussi—; *Bengal:* Jhinga, Jinga, Sataputi—; *Betsimisaraka:* Papangay—; *Bombay:* Gonsali, Jinga, Sirola, Turai—; *Bundelkhand:* Kalitaroi, Satpatiya—; *Burma:* Thabhwotkhawai, Thapwot—; *Cambodia:* Ronung chrung—; *Canarese:* Hirekayi—; *Central Provinces:* Dorca—; *Deccan:* Turai—; *Gold Coast:* Fluted Loofah—; *Gujarat:* Ghisoda, Gonsali, Jhumakhada, Turin—; *Hasada:* Kundurujingga—; *Hausa:* Soson wanka, Soson yama—; *Hindi:* Jinga, Sataputitorai, Torai, Turi—; *Kangra:* Garur, Gharur, Gundoli—; *Konkani:* Gonsali, Sirgonsolim, Sirgousali—; *Kumaon:* Torie—; *La Reunion:* Papangaye, Pipangaye—; *Malayalam:* Djinji, Puichenggah—; *Marathi:* Dodaki, Sataputi, Shirola—; *Mundari:* Dungguijhingga, Jilingjingga, Jingga, Kundrijingga, Motojingga—; *Naguri:* Kundurijhinga—; *Nepal:* Ramtoroi—; *North-Western Provinces:* Jajinga, Kahtaroi, Satpatiya, Taroi, Torai—; *Persian:* Khiyar—; *Portuguese India:* Gonsalim, Patola—; *Sadani:* Jhinga, Jhingi—; *Sanskrit:* Dhamargowa, Dharaphala, Dirghaphala, Gramya, Jalini, Jhingaka, Karkotaki, Koshataki, Kritawedhana, Laghukoshataki, Pitapushpa, Rajakoshataki, Rajimatphala, Saptaputri, Sukosha, Supushpa, Svaduphala —; *Santal:* Parorjhinga—; *Sind:* Turi—; *Sinhalese:* Daravetakola, Vetakola—; *Tamil:* Pekankai, Peyppichukku, Pikunkai—; *Telugu:* Birakaya, Burkai—; *Urdu:* Torai—; *Uriya:* Janhi—; *Visayan:* Saycua—.

Luffa acutangula var. **amara** Clarke in Hook. f. Fl. Brit. Ind. II, 615.—PLATE 448.

Leaves smaller, at first whitish and softly villous, at length scabrid. Flowers smaller. Fruit obovoid, obtusely conical at both ends, 5-10 cm. long, by about 2.5-3.8 cm. thick, 10-ribbed, bitter. Seeds smaller.

Distribution: Throughout India, especially the Western Peninsula, Ceylon.

The plant is slightly pungent, acrid, bitter; laxative; carminative digestible, alexiteric; a tonic to the intestines; cures "vata", "kapha", biliousness, anæmia, liver complaints, leucoderma, piles, inflammation, bronchitis, ascites, jaundice, tumours, tuberculous glands, uterine and vaginal tumours; useful in rat-bite.—The fruit destroys bad taste in the mouth; cures urinary discharges, fever,

leucoderma, bronchitis, asthma, biliousness; used as an errhine for headache.—The seed is used as an errhine for headache (Ayurveda).

The root bark is abortifacient, hydragogue, cathartic, diuretic.—The fruit is of two kinds: white and yellow; bitter and sharp taste; cures fever, cough, asthma, piles.—Seeds beneficial in amenorrhœa (Yunani).

The plant is a bitter tonic and diuretic, recommended in splenic enlargements.

The fruit is violently cathartic and emetic; the pulp is given with water in dog-bite and other different kinds of bites. The juice of the roasted young fruit is appiled to the temples to cure headache. The dried fruit is used as a snuff in jaundice.

The ripe seeds, either in infusion or substance, are used as an emetic and cathartic. In small doses they are expectorant and demulcent.

The kernel of the seeds has a great control over dysentery. The dose as an emetic is from 20 to 30 grains, as a nauseant, from 11 to 15 grains, and as demulcent and expectorant, from 5 to 10 grains. When the kernel is rubbed and mixed with water, it forms a greenish white emulsion, which is the only form in which I have yet used it (Moodeen Sheriff).

The entire plant is said to possess laxative and purgative properties, and is also said to be useful in skin diseases and asthma. It is said to be an antidote to snake-poisoning. A decoction of 1 in 10 was administered to cases of asthma, and was found to give relief in that disease by producing copious expectoration (Koman).

The seeds contain a fixed oil which has been examined chemically by A. K. Menon (1910).

Bengal: Ghoshalata, Jhinga, Titodhundul, Titojhinga, Titotorai—; *Bombay:* Kadudorka, Kadusirola—; *Cambodia:* Ronung prey—; *Canarese:* Kahire—; *Deccan:* Karviturai—; *Gujarat:* Jhumkhadan, Kadvanturian, Kadvighisodi, Vadgisodi—; *Hindi:* Jhimani, Karvitarui, Karvituri, Sankirah—; *Malayalam:* Athanga—; *Marathi:* Divali, Kadudodaka, Kadudodaki, Kadushirali, Kaduturai, Ranturai—; *North-Western Provinces:* Kerula—; *Persian:* Turaitalkh—; *Sanskrit:* Ghantali, Jalini, Karkashachhada, Katukoshataki, Kosha-

taki, Krishna, Kritachhidra, Kritavedhana, Kshveda, Mridangaphalika, Sushodhani, Sutikta, Tikta, Tiktakoshataki, Vanya—; *Tamil:* Peyppirkam—; *Telugu:* Adavibira, Chedubira, Sendubirkai, Verribira—; *Urdu:* Bandal—.

3. **Luffa echinata** Roxb. Hort. Beng. (1814) 104.—PLATE 450.

Climbing but not extensively; stem slender, branched, furrowed, glabrous. Tendrils 2-fid. Leaves 3.8-6.3 cm. long, usually a little broader than long, reniform-suborbicular in outline, broadly cordate at the base, obscurely 5-angled or more or less deeply 5-lobed, the lobes rounded or rarely subacute at the apex, the margins minutely denticulate; petioles 2.5-5 cm. long, striate, puberulous or sometimes slightly scabrid. Flowers usually dioecious. Male flowers: Peduncles 7.5-15 cm. long, usually in pairs, one 1-flowered, the other with a raceme of 5-12 flowers at the apex; pedicels 1-2 cm. long, bracteate near the base. Calyx hairy, 6 mm. long; tube very short; lobes ovate-lanceolate, acute. Petals white, spreading, obovate, twice as long as the calyx, veined. Stamens 3, two with 2-celled anthers. Female flowers: Peduncles 1.3-5 cm. long. Fruit broadly ellipsoid, 2.5-3.8 by 1.3-2 cm., not ribbed, clothed with ciliate bristles 4-6 mm. long; operculum conical, without bristles. Seeds numerous, 4-5 by 3 mm., not winged, slightly verrucose.

Distribution: Sind, Gujarat, Dacca, Dehra Dun, N. Oudh, Bundelkhand, Bengal, Burma.—Abyssinia, tropical Africa.

There are three kinds and all have the same medicinal properties. The plant is bitter, hot; alexiteric, emetic, anthelmintic; cures anal diseases, inflammations, bronchitis, jaundice, fever, asthma, anæmia, consumption, piles, hiccough; good for rat-bite; destroys foul taste in the mouth.—The root is laxative, anthelmintic, analgesic; cures tumours, bronchitis, piles, vaginal discharges, jaundice, "vata".—The anthers are administered by mouth to facilitate delivery (Ayurveda).

The root strengthens the muscles of the neck; tonic to the hair. —The fruit has a bad taste; cures chronic bronchitis and lung complaints (Yunani).

In the Konkan, a few grains of the bitter fibrous contents of the fruit are given in infusion in cholera after each stool; in putrid fevers, the infusion is applied to the whole body, and in jaundice it is applied to the head and also given internally; the infusion has also a reputation as a remedy for colic.

The fruit is considered in North India as a powerful remedy for dropsy. It has purgative properties.

Every part of the plant, either alone or in combination, has been recommended for the treatment of snake-bite (Brihannighantaratnakara, Nighantaratnakara, Rasaratnakara, Yogaratnakara, Bapat). In the Konkan, a few grains of the bitter fibrous contents of the fruit are given in infusion.

The fruit is useless in the symptomatic treatment of snake-bite. It is equally useless when used as an errhine (Mhaskar and Caius).

Bengal: Deyatada—; *Bombay:* Kukarvel—; *Canarese:* Devadangar—; *Gujerati:* Kukaravel—; *Hindi:* Bidali, Ghagarabela, Ghusarana, Sonaiya, Vandala—; *Marathi:* Devadali, Devadangari, Kukdavel—; *Sanskrit:* Akhuvishaka, Çhaturangaka, Dali, Deodalika, Deotada, Devadali, Garagari, Garanashini, Ghora, Ghosha, Jihnutaka, Kadamba, Kantaphala, Karkati, Kataphala, Kharasparsha, Koshaphala, Kukkuti, Lomashapatrika, Pita, Saha, Saramushika, Tarkari, Turangika, Veni, Vishaghni, Vishaha, Vrittakosha—; *Sind:* Jangthori—; *Telugu:* Panibira—; *Urdu:* Kukarabel—.

BENINCASA Savi.

A large trailing or climbing gourd, softly hairy; tendrils 2-fid. Leaves cordate, reniform-orbicular, more or less deeply 5-lobed; petiole without glands. Flowers large, yellow, monoecious, all solitary without bracts. Male: Calyx-tube campanulate; lobes 5, leaf-like, serrate. Petals 5, nearly separate, obovate. Stamens 3, inserted near the mouth of the tube; anthers exsert, free, one 1-celled, two 2-celled, cells sigmoid. Female: Calyx and corolla as in the male. Ovary oblong, densely hairy; style thick, with 3 flexuose stigmas; ovules numerous, horizontal; placentæ 3. Fruit large,

fleshy, oblong, pubescent, indehiscent. Seeds many, oblong, compressed, margined.—Species 2.—Tropical Asia.

B. hispida Cogn. is used medicinally in China, Indo China, and Malaya.

1. **Benincasa hispida** (Thumb.) Cogn. in DC. Monogr. Phan. III (1881) 513.—*B. cerifera* Savi in Bibl. Ital. IX (1818) 158.—PLATE 451 (under *B. cerifera* Savi.)

Stems stout, angular, hispid. Leaves 11.5 cm. diam., hispid beneath; petiole 7.5-10 cm. Male peduncle 7.5-10 cm.; female peduncle shorter. Calyx-teeth when young often narrow and scarcely serrate. Filaments angular, hispid at the base. Fruit 30-45 cm. long, broadly cylindric, not ribbed, hairy, ultimately covered with a waxy bloom.

Distribution: Probably a native of Japan and Java. Cultivated more or less throughout India and in many warm countries.

The fruit has flavour; laxative, diuretic, tonic, aphrodisiac; cures strangury, urinary discharges, urinary calculi, "tridosha", thirst, biliousness, blood diseases; removes foul taste from the mouth; heart tonic (Ayurveda).

The fruit has a bad taste; antiperiodic, cardiotonic, aphrodisiac; enriches the blood; a general tonic.—The seeds are cooling; used in dry cough, fever, urethral discharges, biliousness, thirst, a brain tonic.—The oil from the seeds is soporific, sweetish; good for the brain and the liver; good in syphilis (Yunani).

The fruit possesses alterative and styptic properties, and is popularly known as a valuable antimercurial. It is also said to have cooling properties. It is considered tonic, nutritive and diuretic, and a specific for hæmoptysis and other hæmorrhages from internal organs. The *fresh juice* from the fruit given internally, while a slice of the fruit is at the same time applied to the temples, is said to be an efficacious cure for internal hæmorrhage. According to the Sanskrit authors, it is useful in insanity, epilepsy, and other nervous diseases; the fresh juice is given either with sugar or as in adjunct to other medicines for these diseases.

The seeds possess anthelmintic properties, and are useful in cases of tænia. The expressed oil of the seeds, in doses of half an ounce, repeated once or twice at an interval of two hours, and followed by an aperient, is said to be equally efficacious.

The expressed juice of the mature fruit possesses purgative and alterative properties. It is used in cases where the system has been affected by mercury.

In China, the rind of the fruit is regarded as a cooling medicine. When incinerated, the ash is applied to painful wounds. The seeds are considered to be tonic, nutritive, and demulcent; they are eaten as a delicacy with tea.

Vrindamadhava recommends the juice of the fruit for internal use in snake-bite. The fruit is not an antidote to snake-venom (Mhaskar and Caius).

Annam: Cay muop—; *Arabic:* Majdabh—; *Bengal:* Chalkumra, Kumra—; *Bombay:* Golkadu, Kohala, Koholen—; *Burma:* Kyaukpayon—; *Canarese:* Budekumbalakayi—; *Chinese:* Tung Kua—; *Cutch:* Kohula, Kushmand—; *English:* Ash Pumpkin, Tallow Gourd, Wad Gourd, White Gourd, White Gourd Melon—; *Gujarat:* Bhurukolu, Dorukoru, Koholu—; *Hasada:* Pandeakakaru—; *Hindi:* Golkaddu, Kondha, Kudimah, Kumra, Petha, Phuthia—; *Indo China:* Bi dao, Bi phan, Dong qua, Mak ton, Tra loch—; *Konkani:* Cualim, Kunolem—; *Kumaon:* Bhunja, Kumhra—; *Madagascar:* Voantangondolo—; *Malaya:* Toong kwa, Tung kua—; *Malayalam:* Kumpalam, Kumpalanna—; *Marathi:* Kohala—; *Mundari:* Kakaru, Kakru—; *Naguri:* Pundikakaru—; *Persian:* Kadurumi, Majdabh—; *Portuguese:* Abobora de agua, Canvolenga—; *Punjab:* Chalkumra, Golkaddu, Petha—; *Sanskrit:* Brihatphala, Ghrinavasa, Gramyakarkati, Karkaru, Karkotika, Kumbhanda, Kunjaphala, Kushmanda, Kushmandaka, Kushmandi, Kushpandaha, Nagapushpaphala, Pitapushpa, Pushpaphala, Shikhivardhaka, Suphala, Timisha—; *Sinhalese:* Alupuhul—; *Tagalog:* Condol, Malinga—; *Tamil:* Kalyanappushinikkay, Pusanikkai, Pushini—; *Telugu:* Budidegummadi, Burdagumudu, Pendligummadikaya—; *Urdu:* Petha—; *Visayan:* Candol, Tibiayon—.

MOMORDICA (Tourn) Linn.

Climbing annual or perennial herbs. Leaves entire, lobed or pedately 3-7-foliolate. Tendrils simple or bifid. Flowers yellow or white, monoecious or dioecious. Male flowers corymbose or racemose. Calyx-tube short, campanulate, closed at the bottom with 2-3 incurved oblong scales; lobes 5. Corolla usually 5-partite to the base or nearly so, rotate or broadly campanulate; segments obovate, costate. Stamens 3 (2 in *M. tuberosa*), inserted on the mouth of the calyx-tube; filaments short, free; anthers at first cohering, at length free, one 1-celled, the others 2-celled, the cells flexuose (rarely short and straight or curved), connective not produced at the apex. Rudimentary ovary 0 or glanduliform. Female flowers solitary. Calyx and corolla as in the male. Rudimentary stamens 0, or 3 glands surrounding the base of the style. Ovary oblong or fusiform, 3-placentiferous; ovules many, horizontal; styles slender; stigmas 3. Fruit oblong, fusiform, or cylindric, baccate, indehiscent or 3-valvate, few- or many- seeded. Seeds tumid or flattened, smooth or variously sculptured.—Species 25.—Palaeotropics.

A. Male peduncles 1-flowered
  I. Flowers monoecious
    a. Bracts of male flowers about the middle or below the middle of the peduncle .... 1. *M. charantia.*
    b. Bracts of male flowers at the apex of the peduncle .... 2. *M. balsamina.*
  II. Flowers dioecious
    a. Petioles without glands
      Calyx-lobes linear-lanceolate, acute .... 3. *M. dioica.*
    b. Petioles glandular .... 4. *M. cochinchinensis.*
B. Male flowers in racemes .... 5. *M. tuberosa.*

The fruit and the seeds are violent cathartics and hydragogues.

The following species are used medicinally in Europe—*M. balsamina* Linn.—; in China, Indo China, and Malaya—*M. charantia* Linn., *M. cochinchinensis* Spr.—; in the Philippine Islands, and Guiana—*M. balsamina* Linn., *M. charantia* Linn.—; in Brazil—*M. charantia* Linn.—; in Nigeria—*M. balsamina* Linn.—; in the Gold Coast—*M. charantia* Linn.—; in South Africa—*M. cordifolia* Sond., *M. foetida* Schum., *M. involucrata E.* Mey.—.

OFFICIAL:—The fruit of *M. Elaterium* Linn.=*Ecballium Elaterium* Rich. (Portugal).

1. **Momordica charantia** Linn. Sp. Pl. (1753) 1009. Wight Ic. t, 504.—PLATE 452.

Annual; stem long, much-branched, angled and grooved, more or less pubescent or hairy; young parts hairy or villous. Tendrils simple, slender, elongate, pubescent. Leaves almost orbicular in outline, 5-12.5 cm. diam., pubescent or subglabrous on both sides, cordate at the base, deeply divided into 5-7 lobes, the lobes acute or subacute, apiculate, coarsely spinous-dentate, constricted at the base, the sinus between them narrow, rounded; petioles 2.5-5 cm. long, channelled, pubescent. Flowers monoecious. Male flowers solitary; peduncles 5-10 cm. long, glabrous or pubescent, furnished with a large reniform or orbicular bract at or below the middle. Calyx 8-10 mm. long, pubescent; lobes 5-6 mm. long, elliptic, subacute. Corolla somewhat irregular, lemon-yellow; segments obtuse or emarginate, 1.6-2 cm. long, veined. Female flowers: Peduncles 5-10 cm. long, slender, bracteate usually at or near the base. Staminodes 3, glanduliform. Ovary fusiform, muricate; stigmas 3, bifid. Fruit bright orange-coloured, 5-15 cm. long, pendulous, fusiform, usually pointed or beaked, ribbed, and bearing numerous triangular tubercles giving it the appearance of a crocodile's back, 3-valved at the apex when mature. Seeds 8-13 mm. long, compressed, corrugate on the margin, sculptured on both faces.

Distribution: Cultivated throughout India; also in Malaya, China, tropical Africa and in America.

The root is used in ophthalmia and in prolapsus vaginæ.—The fruit is bitter, cooling; digestible, laxative, antipyretic, anthelmintic, appetiser; cures biliousness, "kapha", blood diseases, anæmia, urinary discharges, asthma, ulcers, bronchitis; the juice is useful in cholera (Ayurveda).

The fruit is very bitter, carminative, tonic, stomachic, aphrodisiac, anthelmintic; astringent to the bowels, but laxative for plethoric constitutions; lessens expectoration; used in syphilis, rheumatism, troubles of the spleen, ophthalmia (Yunani).

In the Konkan, 1/8 of the seer of the juice of the leaves is given in bilious affections, as an emetic and purgative, alone or combined with aromatics; the juice is rubbed in burning of the soles of the feet, and with black pepper is rubbed round the orbit, as a cure for night blindness.

It is used internally as a laxative, and as an ointment for sores. The fruit and leaves are anthelmintic; useful in piles, leprosy, jaundice, and as a vermifuge. The root is considered astringent and useful in hæmorrhoids. The juice of the fresh leaves acts as a mild purgative, and is prescribed for children.

The expressed juice of the plant with chalk is used in aphthæ, and also an emmenagogue in dysmenorrhœa. It is applied externally to the scalp in pustular eruptions.

The fruit is much valued as a stomachic by the Mundas of Chota Nagpur.

In China, the fruit is regarded as tonic, and cooling; but it is a drastic purgative when ripe.

In Guiana, the ripe fruit deprived of its seeds is macerated in sweet almond oil and used as a vulnerary. An infusion of the leaves is taken for contusions. The pounded leaves mixed with some fatty material are made into an ointment useful in scabies and other skin diseases.

In Cambodia, the leaves are considered antipyretic; they are given in delirium.

In the Gold Coast, the plant is used to cure fever; sometimes it is put in the patient's bath water, sometimes in his drinking water, but most commonly into his palm wine. The leaves are crushed and steeped in water which is then given internally as a remedy for diarrhœa and dysentery; it is also used as an enema having powerful astringent properties. The plant is also used as a sexual tonic, and in large doses as a cure for gonorrhœa.

The juice of the fruit is recommended in snake-bite but, whether given internally or applied externally it is equally useless (Mhaskar and Caius).

Arabic: Qisaulbarri, Ulhimar—; *Ashanti:* Nyinya—; *Assam:* Kakiral, Kakral—; *Awuna:* Kakleng—; *Bengal:* Baramasiya,

Jethuya, Karala, Potikakar, Uchchhe—; *Bombay:* Karla—; *Brazil:* Erva de Sao Caetano, Melao de Sao Caetano—; *Burma:* Kehingabin, Kyethenka—; *Cambodia:* Mreas—; *Canarese:* Hagola, Kagalakayi—; *Cantonese:* Koo Kwa Kan—; *Central Provinces:* Karli—; *Ceylon:* Nutipakal—; *Chinese:* Ku Kua—; *Deccan:* Karela—; *English:* Carilla Fruit—; *Ewe:* Kakleng—; *French:* Pandipane—; *French Guiana:* Sorossi—; *Gold Coast:* African Cucumber—; *Gujarat:* Karela, Karelo, Karelu, Korela—; *Hasada:* Karla—; *Hindi:* Karela, Kareli, Karola—; *Hova:* Mafaiba—; *Indo China:* Kho qua, Muop dang, Muop mu—; *Konkani:* Karatim—; *Krepi:* Kakleng—; *Kumaon:* Kurela—; *La Reunion:* Margose—; *Madagascar:* Margose—; *Madras:* Pagel—; *Malaya:* Koo Kwa Kan, Ku Kua Kan, Lai Kua—; *Malayalam:* Kaippa, Kaippavalli, Kappakka, Pantipavel, Pavakkacheti—; *Marathi:* Karale, Karli—; *Mundari:* Karaili, Karla—; *Naguri:* Karaela—; *North-Western Provinces:* Karela, Karola—; *Persian:* Karelah, Simahang—; *Portuguese:* Pepino de Sao Gregorio—; *Portuguese India:* Kakateira—; *Punjab:* Karela, Karila—; *Sanskrit:* Ambuvallika, Brihadvalli, Chiripatra, Kandakataka, Kandura, Kantaphalla, Karaka, Karavalli, Karawallilata, Karavella, Karavellaka, Karavelli, Kathilla, Kathillaka, Katilla, Katillaka, Krimighna, Patu, Pitapushpa, Rahavalli, Sukanda, Sukandaka, Sukshmavalli, Sushavi, Susuvi, Toyavalli, Ugrakanda, Urdhvasita, Varivalli, Visakantaki—; *Sind:* Karelo—; *Sinhalese:* Battukarawilla, Karawila, Kirilla—; *Tamil:* Pakal, Pavakkachedi, Pavakkayi—; *Telugu:* Kakara, Mettakakara, Tellakakara, Urakakara—; *Twi:* Nyinya—; *Urdu:* Karella—; *Uriya:* Karena—.

2. **Momordica balsamina** Linn. Sp. Pl. (1753) 1009.

Monoecious; stem 0.6-1.5 m. long, very slender, branched, grooved, subglabrous. Tendrils simple, filiform, glabrous. Leaves membranous, orbicular in outline, 3.8-7.5 cm. diam., cordate at the base with a broad sinus, palmately 3-5-lobed to about the middle, the lobes rhomboid, deeply lobulate, acute and mucronulate at the apex, usually constricted at the base, the sinus between the lobes broad and rounded; petioles 1.3-3.2 cm. long, striate, pubescent. Male flowers: Peduncles 1-flowered, slightly pubescent at the apex,

otherwise glabrous or nearly so, slender, 2.5-7.5 cm. long; bract towards the apex of the peduncle, 6-10 mm. wide, cordate, orbicular, denticulate, variegated green and white, reticulately veined. Calyx 1 cm. long, pubescent; lobes 6 mm. long, 5-7-nerved, triangular, acute, with a long slender mucro. Corolla subregular, yellowish with a dark base, 1.3 cm. long, obovate, subobtuse, reticulately veined, sometimes apiculate. Anther-cells flexuous, the connective broad. Female flowers: Peduncles 5-13 mm. long, usually ebracteate, or bracteate at the base. Calyx-lobes linear-lanceolate. Ovary fusiform, beaked, verrucose. Fruit 2.5-7.5 cm. long, ovoid, narrowed to both ends, rostrate, fleshy, smooth or muricate. Seeds ash-coloured, ellipsoid, compressed, 10 by 6 by 2.5 mm., rugulose on the flat faces, and with a grooved margin which is tuberculate on the endges.

Distribution: Sind, Gujarat, Deccan, Punjab Plain.—Malaya, Australia, W. Asia, Africa. Introduced in America.

The fruit is occasionally used medicinally in India.

The fruit is famous in Syria for curing wounds. It is cut open, infused in sweet oil, and exposed to the sun for some days, until it becomes red, and then it is preserved for use; dropped on cotton, and applied to a fresh wound, it is considered as a vulnerary, little inferior to the balsam of Mecca.

In French Guiana, it is used in the same way and for the same purpose as *M. charantia.*

Arabic: Mokah—; *Catalan:* Balsamilla, Balsamina—; *Central Provinces:* Mokha—; *English:* Balsam Apple, Balsamina—; *French:* Balsamine mâle, Balsamine rampante—; *French Guiana:* Sorossi—; *Gujerati:* Chhochhidan—; *Hausa:* Garafuni—; *Hindi:* Mokha—; *Ilocano:* Pasia—; *Pampangan:* Apalia—; *Philippines:* Amargoso—; *Sind:* Kurelojangro—; *Spanish:* Balsamina—; *Tagalog:* Ampalaya, Ampalea, Apalaya, Margoso, Palla—; *Tonga:* Nkaka—; *Visayan:* Palia, Sampalia—.

3. **Momordica dioica** Roxb. in Willd. Sp. Pl. IV (1805) 605; Wight Ic. tt. 505, 506.—Plate 453 and 454.

Dioecious, perennial, with tuberous roots; stem slender, branched, furrowed, glabrous and shining. Tendrils simple, elongate, striate,

glabrous. Leaves membranous, broadly ovate in outline, variable, 3.8-10 by 3.2-8 cm., cordate at the base, glabrous, minutely punctate, entire or more or less deeply 3-5-lobed, the lobes triangular, ovate or oblong, distantly denticulate; petioles 1.3-4.5 cm. long, channelled above, pubescent, eglandular. Male flowers: Peduncle solitary, 1-flowered, 3.8-12.5 cm. long, slender, angled, usually pubescent near the top, otherwise glabrous; bract cucullate, inserted a little below the flower and enclosing it, orbicular-reniform, 1.3-2 cm. broad, usually pubescent on both sides, strongly nerved, often ciliolate. Calyx-lobes distant, 5-8 mm. long, linear-lanceolate. Petals 1.3-2.5 cm. long, wholly yellow, oblong-lanceolate. Female flowers: Peduncles nearly as long as those of the male, usually with a small bract near the base. Ovary clothed with long soft papillae. Fruit 2.5-6.3 cm. long, ellipsoid, shortly beaked, densely echinate with soft spines. Seeds many, 1 cm. long, broadly ellipsoid, slightly compressed, slightly and irregularly corrugated, enclosed in a red pulp.

Distribution: Throughout India to Ceylon, ascending to 5,000 ft. in the Himalaya.—Malaya.

1. *Fruited variety*:—The roots are used with benefit in head troubles, urinary calculi; as an errhine in jaundice.—The leaves are aphrodisiac, anthelmintic; cure "tridosha", fever, consumption, asthma, bronchitis, hiccough, piles.—The fruit is pungent, bitter, hot; alexiteric, stomachic, laxative; cures "vata", biliousness, asthma, leprosy, bronchitis, fever, tumours, "tridosha", urinary discharges, excessive salivation, troubles of the heart.—2. *Fruitless variety*:—The root is useful in all kinds of poisoning including snake-bite, and in elephantiasis.—The plant is bitter, pungent, hot; vulnerary; cures "kapha", diseases of the blood, the eye, the heart; heals ulcers; cures erysipelas, bronchitis, snake-bite (Ayurveda).

The toasted root is used to stop bleeding from piles and also in bowel complaints.

In the Konkan, the juice of the root is a domestic remedy for the inflammation caused by contact with the urine of the house-lizard.

The powder or infusion of the dried fruits, when introduced into the nostrils, produces a powerful errhine effect and provokes a copious discharge from the schneiderian mucous membrane.

The tuberous root of the female plant is used in Belgaum as an expectorant, and externally in ague cases as an absorbent. The root of the male creeper is used in ulcers, especially those caused by snake-bites. The unripe fruit is used as a vegetable and given as a delicacy to patients recovering from fever.

The Mundas of Chota Nagpur use the root in urinary complaints. The same ground into a paste and smeared over the whole body is believed to act as a sedative in high fever with delirium.

The root is one of the most prized snake remedies (Sushruta, Brihannighantaratnakara, Nighantaratnakara, Yogaratnakara, Vrindamadhava, Ayurvedaprakasha, Sharangdharsamhita). It is also recommended for scorpion-sting (Sushruta).

Whether given internally or used as an errhine the root is useless in the treatment of snake-bite (Mhaskar and Caius). It is not an antidote to scorpion-venom (Caius and Mhaskar).

Assam: Batkarila—; *Bombay:* Karantoli, Karatola, Kurtoli, Vanthakaratola—; *Burma:* Sabyet, Sapyit—; *Canarese:* Gidhagalu—; *Central Provinces:* Katwal—; *Deccan:* Kurtoli—; *Gujarat:* Kantolan, Kantoli, Kuntola—; *Hasada:* Hocen, Hocon—; *Hindi:* Beksa, Ghosalphal, Golkandra—; *Malayalam:* Erimapasel—; *Marathi:* Banzakartoli, Kartoli—; *Mundari:* Hecen, Hocen, Hocon—; *Naguri:* Hecen—; *North-Western Provinces:* Ghosalphal, Golkandra, Golkankra—; *Punjab:* Dharkarela, Kirara—; *Sanskrit:* Avandhya, Bhaktadamani, Bodhanajali, Bhutapaha, Devi, Diva, Ishwari, Kandashalini, Kandavalli, Kanta, Karkotaki, Mahajali, Mahajalinika, Mahayogeshwari, Manasvini, Manodna, Nagahantri, Nagarati, Nagari, Nakradamani, Pathya, Pitapushpi, Putrada, Sakanda, Sarpadamani, Sarvanshadhi, Srikanda, Sugandha, Vahisi, Vandhya, Vandhyakarkotaki, Vara, Vishakandakini, Vishakantakini, Vishamohaprashamani, Yogeswari—; *Santal:* Karla—; *Sinhalese:* Tumbakaravilla—; *Tamil:* Palupalagakalungai, Paluppakkay, Tumbai—; *Telugu:* Agakara, Potuagakara, Potukandulu, Puagakara—.

4. **Momordica cochinchinensis** Spreng. Syst. III (1826) 14.—Plate 455A.

A strong climber ascending trees, dioecious; root tuberous,

perennial; stem robust, angular, glabrous. Tendrils simple, stout, angled, glabrous. Leaves suborbicular in outline, cordate at the base, 10-18 cm. long and broad, glabrous on both surfaces, the margin near the base furnished with umbilicate glands, divided to the middle or almost to the base into 3 (rarely 5) lobes, the lobes ovate or oblong-lanceolate, acute or acuminate, diverging, the margins entire or faintly toothed; petioles 5-7.5 cm. long, stout, sulcate, almost invariably glandular at the middle and at the apex, glabrous or nearly so. Male flowers: Peduncles 1-flowered, 5-15 cm. long, angularly furrowed, more or less pubescent, especially near the apex; bract at the top of the peduncle embracing the flower, broader than long, 2.8-3.5 by 3.8-5 cm., cordate at the base, pubescent or scabrid. Calyx hirsute or scabrid; lobes 1.3-1.6 cm. long, oblong-lanceolate, acute. Corolla white, tinged with yellow, pubescent outside and more or less so inside; segments reaching 5.7 by 2.5 cm., obovate-oblong or elliptic-oblong, obtuse or subacute. Female flowers: Peduncles 2.5-5 cm. long, with a small bract about the middle. Fruit 10-15 cm. long, ovoid, pointed, red, fleshy, terete, densely covered with raised points about 3 mm. long. Seeds numerous, 2.2 by 1.6 by 0.5 cm., ovoid, much compressed, sculptured on both faces.

Distribution: Throughout India.—Malaya, China, Philippines.

The unripe fruit is sour, hot, appetiser; astringent to the bowels; causes biliousness. The ripe fruit is sweet, oily, acrid; laxative; cures "vata"; causes "kapha" and biliousness (Ayurveda).

The seeds are used for cough and chest complaints; they stimulate uterine discharges (Yunani).

The seeds are considered to be good for cough and pains in the chest. Powdered, they form one of the ingredients of the hot stuff known as *jhal* in Bengal, which, mixed with melted butter, is given to women immediately after parturition, and daily for a few days afterwards.

In Indo China, the roots are given in rheumatism with swelling of the lower limbs. The seeds are used as a maturant and resolvent for boils, abscesses, and bubos.

In China, the seeds are considered aperient and useful in the

treatment of tumours and malignant ulcers, and of obstructions of the liver and spleen.

Bengal: Gulkakra, Kakrol, Kataamala—; *Burma:* Samongnway—; *Chinese:* Mu Pieh Tzu—; *Gujerati:* Karapata—; *Hindi:* Gangerua, Gulkakra, Kakrol, Kathaamla—; *Indo China:* Day gac, Gac, Moc miet tu—; *Malaya:* Fan muh pee, Mook pit tsze, Mu pieh tzu—; *Marathi:* Kakana—; *Sanskrit:* Gangeruka, Karka, Karkaphala, Karkata, Karkataka, Krindana, Kshudradhatri, Kshudramalakasandna, Mrigalendaka, Mrigavitsadrisha, Todana—; *Tagalog:* Boyocboyoc, Buyocbuyoc—; *Telugu:* Adavikakara—; *Urdu:* Kakrol—.

5. **Momordica tuberosa** Cogn. in DC. Monogr. Phan. III (1881) 454.—*M. cymbalaria* Fenzl ex Naudin in Ann. Sc. Nat. sér. 4, XII (1859) 134.—*Luffa tuberosa* Roxb. Hort. Beng. (1814) 104. PLATE 455B (under *M. cymbalaria* Fenzl.).

Monoecious; root woody, tuberous, perennial; stem very slender, scandent, branched, striate, pubescent or subglabrous. Tendrils filiform, slightly pubescent, simple. Leaves orbicular-reniform in outline, 2-4.5 by 2.5-5 cm., glabrous, or with a few scattered hairs, punctate (but not scabrid) on both surfaces, deeply cordate at the base, obtusely but not deeply 5-7-lobed, the lobes short, acute or obtuse; petioles 1.3-3.8 cm. long, striate, pubescent. Male flowers in 2-5-flowered racemes; peduncles 6-25 mm. long, filiform, pubescent, ebracteate; pedicels 3-10 mm. long. Calyx hairy; tube short, broadly campanulate, narrowed at the base; lobes 6 mm. long, lanceolate, acute. Corolla pale yellow; segments obovate, obtuse, 1-1.3 cm. long, stamens 2; filaments very short, thick, flattened; anthers 2 mm. long, one 2-partite, the others 3-partite, the cells conduplicate, the connective broad. Female flowers: Peduncles 2-3.8 cm. long, slender, ebracteate. Ovary fusiform, beaked; style stout; stigmas 2, spreading, 2-partite. Fruit 2-2.5 cm. long, pyriform or broadly fusiform, narrowed into the curved peduncle, fleshy, dark green, 8-ribbed, sparsely hairy. Seeds 4-6 mm. long, broadly ovoid, slightly compressed, strophiolate, not margined; testa polished and shining, dark brown.

Distribution: Deccan, S. M. Country, Carnatic.—Tropical Africa.

The tubers are used to procure abortion.
Marathi: Kadavanchi—.

CUCUMIS (Tourn.) Linn.

Annual herbs with a perennial root, climbing or trailing, hispid or scabrous. Tendrils simple, sometimes straight and spinescent. Leaves entire or palmately 3-7-lobed or 5-angled. Flowers yellow, monoecious. Male flowers fascicled (rarely solitary). Calyx-tube turbinate or campanulate; lobes 5. Corolla subcampanulate, deeply 5-lobed or 5-partite. Stamens 3, free; filaments short; anthers free, oblong, one 1-celled, the others 2-celled, the cells linear, straight, curved or flexuose, the connective produced above into a papillose appendage. Pollen smooth. Rudimentary ovary glanduliform. Female flowers solitary. Calyx and corolla as in the male. Rudimentary stamens 0. Ovary ovoid or globose, 3-5-placentiferous; ovules many, horizontal; style short; stigmas 3, obtuse. Fruit fleshy or corky, globose or cylindric, terete or obtusely 4-angled, smooth or echinate, indehiscent, or 3-valved and tardily dehiscent. Seeds numerous, oblong, compressed, usually smooth.—Species 25.—Tropics and subtropics.

A. Fruit smooth, glabrous or pubescent
  1. Leaves deeply cut into 5-7 obtuse lobes .... 1. *C. trigonus.*
  2. Leaves usually 5-angled, softly hairy .... 2. *C. melo.*
  3. Leaves ovate, 5-angular or slightly lobed, lobes acute, hispidulous on both surfaces and also often with soft hairs .... 4. *C. sativus.*
B. Fruit echinate .... 3. *C. prophetarum.*

The unripe fruit is emetic; the seeds are a powerful diuretic.

The following are used medicinally in Europe—*C. melo* Linn., *C. melo* var. cultus Kurz., *C. sativus* Linn.—; in Arabia—*C. prophetarum* Linn.—; in Malaya—*C. melo* Linn.—; in Indo China—*C. melo* Linn., *C. melo* var. *cultus* Kurz., *C. sativus* Linn.—; in China—*C. melo* Linn., *C. melo* var. *cultus* Kurz., *C. sativus* Linn.—; in Japan—*C. melo* Linn.—; in Brazil—*C. melo* Linn.—; in South Africa—*C. africanus* Linn., *C. dissectifolius* Naud., *C. hirsutus* Sond., *C. prophetarum* Linn.—; in Madagascar—*C. sativus* Linn.—; in

Nigeria—*C. ficifolius* A. Rich., *C. melo* Linn., *C. prophetarum* Linn.—.

Official:—In Portugal, the seeds of *C. melo* Linn., the unripe fruit of *C. sativus* Linn., and the pulp of *C. colocynthis* Linn. (*Citrullus colocynthis* Arnott and Schrader).

1. **Cucumis trigonus** Roxb. Hort. Beng. (1814) 70; Wight Ic. t. 497.—*C. pseudo-colocynthis* Royle Ill. 220, t. 47, f. 2.—Plate 456.

Perennial, scabrid, monoecious; stems 0.9-1.5 m. long, slender, angled, rough with short rigid hairs. Tendrils simple, leaves suborbicular in outline, 2.5-5 cm. long and broad (sometimes larger), scabrid on both surfaces, hispid on the nerves beneath, cordate at the base, deeply palmately 5-7-lobed, the lobes ovate-oblong or obovate, often narrowed at the base, rounded at the apex, lobulate or dentate; petioles slender, striate, scabrid, often hispid, 1.3-5 cm. long. Male flowers: Peduncles slender, 5-10 mm. long, in small clusters (rarely solitary). Calyx narrowly campanulate, hairy; tube 3-4 mm. long; teeth short, subulate. Corolla yellow, 4-6 mm. long, more or less pubescent; segments elliptic, acute. Appendage of the connective of the anthers a little shorter than the anther. Female flowers: Peduncles slender, 1.3-2.5 cm. long in fruit. Ovary hairy. Fruit ellipsoid or subglobose, 3.8 by 3.2 cm., longitudinally variegated with 10 green stripes, pale yellow when ripe, with bitter pulp. Seeds white, ellipsoid, not margined.

Distribution: Throughout the greater part of India, Ceylon.—Afghanistan, Persia, Malaya, N. Australia.

The green fruit is bitter, slightly sour; stomachic; cures "kapha" and biliousness; increases "vata". The dried fruit is indigestible; astringent to the bowels; improves taste; cures "kapha" and biliousness (Ayurveda).

The pulp of the fruit is very bitter and is a drastic purgative. A decoction of the roots is preferred as being milder in its operation and causing less irritation.

The seeds are cooling and astringent, and useful in bilious disorders.

Among the Mundas of Chota Nagpur the pulp, without the seeds, is used to clear the stomach; it causes vomiting or purging. The pounded roots mixed with any oil are rubbed on the body in fever.

In Malabar, the fruit is used to prevent insanity, to strengthen memory and remove vertigo.

The juice of the fresh leaves, either single or combined, is given internally in snake-bite (Bapat, Roberts). A decoction of the roots is also used (Roberts).

The root and the leaves are useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Bengal: Bangumak, Gomuk—; *Bombay:* Karit, Takmaki—; *Ceylon:* Metukku—; *Gujerati:* Kothiban—; *Hasada:* Didimbu, Dihdimbu—; *Hindi:* Bhakura, Bislambhi, Bislombi, Gorakhakakadi, Janglindrayan, Sengha—; *Konkani:* Karatim, Karit—; *Las Bela:* Chibarwal—; *Marathi:* Karita, Shendada, Takamake—; *Mundari:* Bhaisdimbu, Bhaisidimbu, Bingdimbu, Birdimbu, Gusadimbu, Gusidimbu, Hatudimbu, Hondimbu, Huringdimbu, Jaitidimbu—; *Naguri:* Baisidimbu, Gusidimbu, Hatudimbu, Mandargula—; *North-Western Provinces:* Bislumbhi, Indrayan—; *Portuguese:* Tindalica—; *Punjab:* Kachri, Kakri—; *Sadani:* Dimbu—; *Sanskrit:* Bahuphalla, Chitra, Chitraphala, Chitravalli, Devi, Garakshivriksha, Godumba, Kapilakshi, Katphala, Kumbhasi, Laghuchirbhitta, Maruja, Mrigadani, Mrigachirbhitta, Mrigakshi, Mrigervaru, Mrigeshana, Pathya, Schvetapushpa, Vichitra, Vishala—; *Sind:* Chiber—; *Sinhalese:* Gongkakiri—; *Tamil:* Kattuttumatti—; *Telugu:* Adavipuchcha, Kodibudama, Kodibudinga, Nallabudama, Nallabudinga, Pambudinga, Pulcha—; *Uraon:* Dimbo—; *Windor:* Melia—.

2. **Cucumis melo** Linn. Sp. Pl. (1753) 1011.—PLATE 457B.

An annual. Stems creeping, angular, scabrous. Leaves about 7.5 cm., diam., orbicular-reniform in outline, 5- angled or -lobed, scabrous on both surfaces and also often with soft hairs; lobes not deep nor acute; petiole 5 cm. Petals 1.6 cm. Female peduncle sometimes 5 cm. Fruit spherical ovoid elongate or contorted, glabrous or somewhat hairy, not spinous nor tuberculate.

Distribution: Extensively cultivated throughout India. Said to be truly wild in India, Baluchistan and tropical Africa.

The unripe fruit is bitter, sour; may cause skin eruptions and strangury. The ripe fruit is sweet, oily, wholesome; cooling, fattening; tonic, laxative, aphrodisiac, diuretic; cures "vata", biliousness, insanity, ascites; allays fatigue; causes "kapha" (Ayurveda).

The fruit is of different kinds: sweet, acrid, sour; tonic, laxative, galactagogue, diuretic, diaphoretic; strengthens the heart, the brain, and the body in general; cures ophthalmia, urinary discharges; causes congestion of the eyes in plethoric people; gives headache; may cause indigestion.—The rind is vulnerary; applied to the hypogastrium it causes diuresis.—The seeds are lachrymatory, diuretic, tonic; used in ophthalmia, liver and kidney troubles, bronchitis, burning of the throat, chronic fever, thirst (Yunani).

The seeds are supposed to be a cooling medicine. They are edible, nutritive and diuretic, and used in painful discharges and suppression of urine.

The fruit is considered cool and astringent, and is given in cases of dyspepsia. The oil from the seeds is said to be very nourishing.

Not only the seeds but the pulp of the fruit is a powerful diuretic, very beneficial in chronic, and also in acute, eczema.

In China and Japan, the stalks of the fruit are considered cooling and demulcent. General anasarca and indigestion are said to yield to its use.

Afghanistan: Sardapaliz, Sirdapaliz—; *Arabic:* Battigh, Dummeiri, Kauun—; *Baluchistan:* Kharbuze—; *Bengal:* Kakri, Kakur, Kankur, Kharmuj, Phuti—; *Bombay:* Chibuda, Kakadi, Kharabuja, Kharbuj—; *Burma:* Takhva—; *Catalan:* Melo, Melonera—; *Central Provinces:* Dungra—; *Chinese:* Kan Kua, Tien Kua—; *Danish:* Melon—; *Deccan:* Kakdi—; *Dutch:* Meloen—; *English:* Melon, Sweet Melon—; *French:* Melon—; *German:* Melone—; *Gujarat:* Chibdu, Shakarateti, Tarbucha—; *Hausa:* Gurji—; *Hebrew:* Abatishim—; *Hindi:* Kachra, Kakni, Kakri, Kharbuja, Khurbuj, Patkira, Phut, Tuti—; *Hungarian:* Dinnye—; *Indo China:* Cam qua, Dua hong, Kiem qua—; *Italian:* Pepone, Popone—; *Japan:* Mukuwauri, Tenkwa—; *Kangra:* Kukri—; *Kathiawar:* Taliyan—; *Konkani:* Chibdud, Gibud, Molao—; *Ladak:* Zaghun—; *Madras:* Mulam—; *Malaya:* Tien Kua, Tien Kwa

tee—; *Manjia:* Bakily—; *Marathi:* Chibunda, Kharbuja—; *Mundari:* Berataear, Buttaear—; *Naga:* Remo—; *Pegu:* Thakwahumway—; *Persian:* Kharbuzeh—; *Polish:* Melon—; *Poona:* Tarkaddi—; *Portuguese:* Meloeiro, Melao—; *Roumanian:* Bosar, Lubenita, Pepene galben—; *Russian:* Melon—; *Sadani:* Kangkur—; *Sanskrit:* Amritavha, Dashangula, Ervaru, Karkati, Kharbuja, Madhupaka, Madhuphala, Phalaraja, Shadbhuja, Shadrekha, Shanmukha, Tikta, Tiktaphala, Vrittakarkatti, Vrittervaru—; *Santal:* Tarbuj—; *Sind:* Gidhro—; *Slavonia:* Dinja—; *Sokoto:* Gwalli—; *Spanish:* Melon, Melon moscatel—; *Sudan:* Tagesrarit—; *Swedish:* Melon—; *Tamil:* Kakarikkai, Vellarikkai—; *Tartary:* Kaun—; *Telugu:* Karbujadosa, Peddadosrai, Peddakai—; *Urdu:* Kharbuzah—; *Visayan:* Atimon, Catimon—.

2a. **Cucumis melo** var. **momordica** Duthie & Fuller Field & Gard. Crops pt. II, 50, t. 49.—*C. momordica* Roxb. Fl. Ind. III, (1832) 720.—Plate 457A.

The fruit is cylindrical and quite smooth, and when ripe bursts spontaneously, its colour at that time being yellow often mottled with dark green. It varies in size from 30-60 cm. long, and from 7.5-15 cm. diam., and weighs from 4-8 lbs. The seeds are smaller than those of the melon.

Distribution: Cultivated in many parts of India.

The flowers cause "tridosha" and dyspepsia.—The unripe fruit is sweet, dry, indigestible; astringent to the bowels; cures "kapha" and biliousness; causes "vata". The ripe fruit is hot; causes biliousness (Ayurveda).

The seeds are cooling, indigestible; tonic to the heart and the brain; cause cough (Yunani).

The seeds are used as a cooling medicine.

Bengal: Phuti—; *Hindi:* Kachra, Phunt, Phut, Tuti—; *Mundari:* Buttaear—; *Persian:* Khiyaredashti—; *Sanskrit:* Chirbhita, Chirbhitika, Chitraphala, Dhenudugdha, Ervaru, Gorakshakarakati, Karkachirbhita, Kshetrachirbhita, Panduphala, Pathya, Rochanaphala, Suchitra—; *Tamil:* Kakarikkai—; *Telugu:* Peddakai, Peddadosrai—; *Urdu:* Phut—.

2b. **Cucumis melo** var. **utilissimus** Duthie & Fuller l. c. pt. II, 55, tt. 53, 54.—*C. utilissimus* Roxb. Fl. Ind. III, (1832) 721.—PLATE 458 (under *C. utilisimus* Roxb.).

The fruit varies in shape from shortly oval or cylindrical to elongate, often reaching a length of 0.9 m. It varies in colour from dark green to nearly white, usually changing to a bright orange colour when ripe. The seeds are smaller than those of the melon.

Distribution: Cultivated in many parts of India.

The unripe fruit is sweet, tasty; dry, cooling; astringent, diuretic, cures biliousness, strangury; indigestible; causes "vata", "kapha", and flatulence. The ripe fruit is hot; tonic, stomachic; cures thirst, fatigue; causes biliousness and derangement of the blood. —The root of the sweet variety is used as a sedative for uterine pains in pregnancy (Ayurveda).

The fruit is fattening; used in thirst, fever, and biliousness; there are three varieties: sour, bitter, sweet.—The seeds are diuretic, purgative, antipyretic; enrich the blood; allay thirst; improve the complexion.—The oil from the seeds is sweet and used in fever; good for brain and body.—The root of the sweet variety is emetic (Yunani).

The seeds are described as cooling, edible, nutritive and diuretic, and are used in painful micturition and suppression of urine. The drachms of the seeds, rubbed into a pulp with water are given alone or in combination with salt and *Kanjika*.

The powder of the toasted seeds is described as a powerful diuretic, and serviceable in promoting the passage of sand or gravel (Roxburgh).

Arabic: Kissakadam—; *Bengal:* Kakur—; *Bombay:* Kakadi—; *Deccan:* Kakdi—; *Gujerati:* Kankadi—; *Hindi:* Kakri—; *Kangra:* Kukri—; *Marathi:* Kakadi, Valuka—; *Persian:* Khiyajard, Khiyata-java—; *Poona:* Tarkaddi—; *Sanskrit:* Bahukanda, Brihatphala, Chhardapanika, Chirbhati, Ervaru, Hastidantaphala, Hastiparni, Irvaru, Karkataksha, Karkati, Lomashakanda, Lomashi, Mutrala, Mutraphala, Pinasa, Shantanu, Sthula, Toyaphala, Trapusha, Urvaru, Valungi, Vyalapatra—; *Tamil:* Kakkarikkay, Vellarikkay—; *Urdu:* Kakri—.

3. **Cucumis prophetarum** Linn. Cent. Amoen. Acad. IV (1759) 295.

Monoecious. Stems slender, branched, angled and grooved, scabrid. Tendrils very short, striate, sometimes 0. Leaves polymorphous, rigid, 2-5 cm. long and broad, somewhat ash-coloured, scabrid, coarsely hairy on the nerves beneath, cordate or truncate at the base, frequently 3-lobed, the lobes often lobulate with rounded apices, the terminal lobe often contracted at the base; nerves prominent beneath; petioles 1.3-2.5 cm. long. Male flowers solitary or fascicled; peduncles filiform, densely hairy, 1.25-5 mm. long. Calyx-tube subcylindric, 4 mm. long, densely hirsute; teeth linear, 3 mm. long. Corolla hairy, 3-4 mm. long; segments ovate-oblong, subacute. Filaments filiform, slightly hairy; anthers oblong, the appendage to the connective slightly dilated at the apex. Female flowers: Peduncle (in fruit) stout, 1.3-2.5 cm. long. Fruit subglobose, 2.5-3.8 cm. long and nearly as broad, longitudinally striped with green and white, echinate, the spines not or scarcely pungent, 1.25-3 mm. long. Seeds ellipsoid, not margined, 4 mm. long.

Distribution: Sind, Baluchistan, Merwara, Rajputana, Deccan, in dry districts Bellary.—Persia, Arabia, Egypt, Abyssinia.

The plant is emetic and purgative.

In Baluchistan, about four mashas of the dry roots well pounded and eaten with curds or butter act as a strong purgative. At Las Bela the fruit is taken in milk to cure fever (Hughes-Buller).

The Sutos of South Africa use the fruit pulp as a purgative. The Kwenas and Chuanas administer the plant with milk to dogs for the relief of vomiting; the preparation purges.

Afrikaans: Bitterappel, Gifappel—; *Chuana:* Thlare-sa-mpja—; *Gujarat:* Kantalanindranan—; *Hindi:* Kharindroyan—; *Kachhi:* Mitera—; *Kwena:* Thlare-sa-mpja—; *Las Bela:* Kandir, Kinnat—; *Marathi:* Kanteindrayan—; *Porebunder:* Indranan—; *Pushtu:* Dangarselai—; *Sanskrit:* Aindri, Kakadini, Kshundrakantaphala—; *South Africa:* Wild Cucumber—; *Suto:* Monyaku—.

4. **Cucumis sativus** Linn. Sp. Pl. (1753) 1012.—Plate 459.

A hispidly hairy climber with membranous deeply cordate

angled or shallowly 3-5-lobed leaves about 11.5 cm. diam., the larger up to 15 by 14 cm., both sides hairy with softish hairs but the upper with thickened bases and the ribs beneath scabrid, or hispid, margin denticulate, terminal lobe sometimes lanceolate and basal lobes sometimes subhastate. Petiole 5-10 cm. Flowers yellow 1.8-2.5 cm. diam. Males clustered, hypanthium tubular or campanulate with long white hairs 6.5-7.5 mm., sepals linear spreading 3.8-5 mm., filaments very short, anthers cohering with connective crested or clavate above the cells. Female solitary, hypanthium 3.8 mm. more urceolate with oblanceolate sepals 5 mm., thickly covered with very bulbous-based hairs or soft spines ending in a deciduous hair so that the fruit is covered with harsh hairs of soft spines and finally more or less muricate, cylindric.

Distribution: N. India is considered to be the original home of this species. Cultivated in all parts of India, and in warm and temperate countries throughout the world.

The medicinal properties are the same as those of *C. melo* var. *utilissimus* (Ayurveda, Yunani).

The fruit is applied externally to relieve inflammation.

The seed possesses cooling properties. It is also used as a diuretic.

The leaves, boiled and mixed with cumin seeds, roasted and powdered, and administered in throat affections.

In Madagascar, the Betsileo use the fruit as an anthelmintic.

The oil from the seeds has been examined for its constants (Agricultural Ledger, 1911-12).

Cucumber contains a fairly strong proteolytic enzyme which is ereptic in nature (Chopra and Roy; 20th Ind. Sc. Congress, Patna, 1933).

Bengal: Khira, Sasa—; *Bombay:* Kakri, Kankri—; *Burma:* Thagwa, Thakhwathee—; *Canarese:* Santekayi—; *Catalan:* Cogombre—; *Chinese:* Hoang Koua, Hu Kua—; *Dutch:* Konkommer—; *English:* Cucumber—; *French:* Concombre, Concombre commun, Concombre cultivé—; *German:* Gurke, Kunkummer—; *Greek:* Sikya—; *Gujarat:* Kakari, Kankdi, Tansali—; *Hebrew:* Qishooaim—; *Hindi:* Khira—; *Hova:* Voantangombazaha—; *Hungarian:*

Uborka—; *Indo China:* Bi bai, Dua chuot, Dua gang, Hoang qua, Ho qua, Tra sac—; *Italian:* Cedriuolo, Cetriolo, Cetriuolo, Citriuolo—; *Konkani:* Kankri, Touxem, Tovxini—; *Madras:* Vellari—; *Marathi:* Kakdi, Khira, Tavase—; *Mundari:* Bakritaear, Taear—; *Orissa:* Kaknai—; *Persian:* Shiyarekhurd—; *Polish:* Ogorek—; *Portuguese:* Pepineiro, Pepino—; *Punjab:* Khira, Khiyar—; *Roumanian:* Castravete—; *Russian:* Oguretz—; *Sanskrit:* Bahuphala, Kandalu, Kantakilata, Kantakiphala, Kantalu, Koshaphala, Pitapushpa, Sudhavasa, Sushitala, Trapukarkati, Trapusha, Tundilaphala—; *Simla:* Kakri—; *Sinhalese:* Pipingha—; *Spanish:* Cohombro, Pepino—; *Swedish:* Gurca—; *Tamil:* Pipingkay—; *Telugu:* Dozakaya—; *Visayan:* Cabul, Calavaya—.

CITRULLUS Forsk.

Perennial herbs usually trailing. Tendrils 2-3-fid, rarely undivided. Leaves deeply 3-7-lobed, the lobes usually lobulate. Flowers rather large, yellow, monoecious, all solitary. Male flowers: Calyx-tube broadly campanulate; lobes 5. Corolla 5-partite beyond the middle, subcampanulate; segments oblong-ovate, obtuse. Stamens 3; filaments short, free; anthers scarcely cohering, one 1-celled, the others 2-celled, the cells linear, flexuose, the connective not produced. Pollen smooth. Rudimentary ovary glanduliform. Female flowers: Calyx and corolla as in the male. Rudimentary stamens 3, setose or ligulate. Ovary ovoid, 3-placentiferous; ovules many, horizontal; style short; stigmas 3, thick, reniform. Fruit globose or ellipsoid, smooth, fleshy, indehiscent. Seeds very many, much compressed, smooth.—Species 4.—Africa, Mediterranean, tropical Asia.

1. Leaves deeply divided, harshly scabrid .... 1. *C. colocynthis.*
2. Leaves deeply divided, or but moderately lobed, glabrous or somewhat hairy, hardly scabrid .... 2. *C. vulgaris.*

C. Colocynthis Schrad. is used medicinally in Guinea and in the Philippine Islands; *C. vulgaris* Schrad. in Russia, China, Indo China, Guiana; *C. amarus* Schrad., *C. caffer* Schrad. in South Africa.

OFFICIAL:—The fruit of *C. Colocynthis* Schrad. (Austria,

Denmark, France, Great Britain, Holland, Hungary, Japan, Norway, Sweden); *C. Colocynthis* (Linne) Schrader (Germany, Switzerland, United States); *C. Colocynthis* (L.) Schrader=*Cucumis Colocynthis* Linn. (Italy).

1. **Citrullus colocynthis** Schrad. in Linnaea XII (1838) 414; Wight Ic. t. 498.—PLATE 460.

Monoecious; root perennial; stems diffuse or creeping, slender, angled, branched, hirsute or scabrid. Tendrils simple or 2-fid, slender, hairy. Leaves very variable, 3.8-6.3 by 2.5-5 cm. in the wild form (larger in the cultivated one), usually deltoid in outline, pale green above, ashy beneath, scabrid on both surfaces, 5-7-lobed or very commonly 3-lobed, the middle lobe the largest, each lobe deeply pinnatifid or sinuate-lobulate, the segments obtuse; petioles 1.3-2.5 cm. (longer in the cultivated form), densely hirsute. Male flowers: Peduncles 6-13 mm. long, villous. Calyx hairy, campanulate, 5 mm. long; teeth lanceolate, 2 mm. long. Corolla 6 mm. long, pale yellow; segments obovate, apiculate. Female flowers: Ovary ellipsoid, densely hairy. Fruit globular, slightly depressed, 5-7.5 cm. diam., variegated green and white, glabrous when ripe, filled with a dry spongy very bitter pulp; epicarp thin. Seeds 4-6 mm. long, pale brown.

Distribution: Throughout India and Ceylon, both wild and cultivated. Also indigenous in Arabia, W. Asia, N. and tropical Africa and in the Mediterranean region.

The fruit is bitter, pungent; cooling, purgative, anthelmintic, antipyretic, carminative; cures tumours, ascites, "kapha", leucoderma, ulcers, asthma, bronchitis, urinary discharges, jaundice, enlargement of the spleen, tuberculous glands of the neck, dyspepsia, constipation, anæmias, throat diseases, elephantiasis; useful in abnormal presentations of the fœtus and in atrophy of the fœtus.—In addition to the above properties the root has a beneficial action in inflammation of the breasts, pain in the joints; externally it is used in ophthalmia and in uterine pains (Ayurveda).

The properties are the same as those of *Trichosanthes palmata* (Yunani).

In the Konkan, the fruit and root, with or without nux-vomica,

is rubbed into a paste with water and applied to boils and pimples. In rheumatism, equal parts of the root and long pepper are given in pill. A paste of the root is applied to the enlarged abdomen of children.

The fruit and seeds are used as a purgative in some parts of Baluchistan (Hughes-Buller).

In Guinea, cataplasms of the leaves are applied in migraine and neuralgia.

The fruit and the root are prescerībed in the treatment of snake-bite (Charaka, Sushruta, Roberts) and scorpion-sting (Charaka, Sushruta, Chakradatta, Haritasamhita).

The fruit and root are useless in the treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Arabic: Aulqum, Habzal, Hamzal, Humzil—; *Baluchistan:* Kurkushta—; *Bengal:* Indrayan, Makhal—; *Bombay:* Indrayan, Kaddukankri—; *Burma:* Khiasi, Khiati, Kiyasi—; *Canarese:* Pavamekkekayi, Tumtikayi—; *Ceylon:* Peykkommaddi—; *Danish:* Kolokvinter—; *Deccan:* Henzil, Indrawan—; *Dutch:* Bitter Apple, Kwintappel, Koloquint, Wilde Kauwoerde—; *English:* Bitter Apple, Bitter Cucumber, Colocynth, Coloquintide—; *French:* Calebasse de serpent, Coloquinte, Concombre amer, Melon du loup—; *Fulah:* Corin m'bodi—; *German:* Alhandal der Araber, Koloquinte—; *Greek:* Kolokynthis, Sikya pikra—; *Gujarat:* Indrak, Indranan, Indravana, Indravanan, Indravarana, Indravarnan, Tras, Truna-deda—; *Hindi:* Ghorumba, Indrayan, Makal—; *Hungarian:* Sartok— *Italian:* Cocomero amaro, Coloquintida—; *Kharan:* Kulkusht—; *Las Bela:* Darwawal, Kherengiriri—; *Malayalam:* Peykommutti—; *Marathi:* Indraphal, Indravana, Indrayan, Kadu-vrindavana, Thorliyindrayan—; *Norway:* Kolokvint—; *Persian:* Hindavanahetalkh, Kabistetalkh, Kharbuzaherubah, Karbuzahe-talkh—; *Portuguese:* Coloquintida—; *Roumanian:* Castravete amar—; *Russian:* Gorkaya tikva, Kolokvint—; *Sanskrit:* Atmaraksha, Brihadvaruni, Brihatphala, Chitrala, Chitraphala, Chitravalli, Devi, Dirghavalli, Gajachirbhira, Hastidanti, Kapilakshi, Katurasa, Kaya, Kumbhasi, Mahaphala, Mahendravaruni, Mahendri, Mrigadini, Mrigakshi, Mrigevaru, Ramya, Shvetapushpa, Soumya, Trapusi,

Tunvasi, Urupriya, Vishala—; *Shahrig:* Marghun—; *Sibi:* Marghuni, Truh—; *Sind:* Trujogosht, Trujopar—; *Sinhalese:* Shetiputsa, Tittakommodu, Yakkomadu—; *Soussou:* Serere—; *Spanish:* Coloquintida, Tuera—; *Swedish:* Kolokvint—; *Tamil:* Peykkumutti, Peyttumatti, Verikkummatti, Verittumatti—; *Telugu:* Chittipapara, Etipuchchha, Paparabudama, Veripuchchha, Veriputsa—; *Urdu:* Indrayan—; *Zhob:* Maraghuna—.

2. **Citrullus vulgaris** Schrad. ex Eckl. & Zeyh. Enum. 279.—*Cucurbita Citrullus* Linn.; Roxb. Fl. Ind. III. (1832) 719.—PLATE 461.

An extensively climbing annual with thick angular branching stems; young shoots villous, woolly at their tips. Tendrils bifid, stout, pubescent. Leaves 7.5-20 cm. long, deeply divided, or but moderately lobed, glabrous or somewhat hairy, hardly scabrous; petiole a little shorter than the limb, villous. Calyx-lobes narrowly lanceolate, equalling the tube. Corolla yellow within, greenish outside and villous; lobes ovate-oblong, obtuse, prominently 5-nerved. Fruit up to 25 cm. diam., subglobose or ellipsoid, smooth, greenish or clouded, often with a glaucous waxy coating; flesh juicy, red or yellowish white. Seeds usually margined.

Distribution: Largely cultivated throughout India and in all warm countries. Indigenous in tropical and S. Africa.

The unripe fruit is sweet; cooling, fattening, strengthening, aphrodisiac, astringent to the bowels; indigestible; cures jaundice.—The ripe fruit is sweet; cures "kapha" and "vata"; causes biliousness.—The seed is sweet, fattening, aphrodisiac.—The leaves are bitter, hæmatinic (Ayurveda).

The fruit is tasteless when unripe, sweet when ripe; cooling, expectorant, diuretic, stomachic; purifies the blood; allays thirst; cures biliousness; good for sore eyes, scabies, itching.—The seeds are tonic to the brain (Yunani).

The seeds are used as a cooling medicine. In Bombay, they are also considered diuretic and strengthening.

The Vytians prescribe the juice of the fruit to quench thirst, and also as an antiseptic in typhus fever (Ainslie).

2a. **Citrullus vulgaris** var. **fistulosus** Duthie & Fuller Field & Gard. Crops. pt. II, 46, t. 47.—*C. fistulosus* Stocks in Hook. Kew. Journ. III. (1851) 74, t. 3.

Stems and petioles hollow. Tendrils 3-4- rarely 5- fid. Leaves much less divided. Fruit about the size of a small turnip, depressed at each end, hispid when young, afterwards glabrous.

Distribution: Cultivated in the W. districts of the Upper Gangetic Plain, in the Punjab and Sind.

The seeds are used medicinally.

Punjab: Tandus, Tendu, Tinda—; *Sind:* Dilpasand—.

COCCINIA Wight & Arn.

Slender scandent or prostrate herbs; root often tuberous. Tendrils slender, simple. Leaves petiolate, deltoid or subrotund, angled or lobed, sometimes glandular beneath. Flowers rather large, white or yellow, dioecious. Male flowers solitary, or subcymose at the apex of a peduncle. Calyx short, campanulate or turbinate; limb 5-lobed. Corolla campanulate, shortly 5-fid. Stamens 3; filaments connate into a column, rarely free; anthers connate into a capitulum or cohering, the cells conduplicate. Rudimentary ovary 0. Female flowers solitary. Calyx and corolla as in the male. Rudimentary stamens 3, short or long. Ovary ovoid or ellipsoid, 3-placentiferous; ovules many, horizontal; style slender; stigmas 3, bifid. Fruit baccate, ovoid or ellipsoid, indehiscent. Seeds many, ovoid, compressed, margined; testa smooth or scrobiculate.—Species 20.—Warm Africa and Asia.

C. indica Wight and Arn. is used medicinally in Indo China, *C. palmata* Cogn. in Nyasaland.

1. **Coccinia indica** Wight & Arn. Prodr. (1834) 347; Wight Ill. t. 105* bis.—*Momordica monadelpha* Roxb. Fl. Ind. III (1832) 708.—*Cephalandra indica* Naud in Ann. Sc. Nat. sér. V, V. (1866) 16.—PLATE 462A. (under *Cephalandra indica* Naud).

Perennial, scandent or prostrate, much-branched; root thick; stems grooved, slender, glabrous. Tendrils slender, striate, simple. Leaves 5-10 cm. long and broad, bright green above, paler beneath,

studded and sometimes rough with papillae, palmately 5-nerved from a cordate base, often with circular glands between the nerves, obtusely 5-angled or sometimes deeply 5-lobed, the lobes broad, obtuse or acute, apiculate, more or less sinuate-toothed; petioles 2-3.2 cm. long. Male flowers: Peduncles 1-flowered, 2-3.8 cm. long, subfiliform. Calyx-tube glabrous, broadly campanulate, 4-5 mm. long; teeth 2.5 mm. long, linear. Corolla 2.5 cm. long, veined, pubescent inside, glabrous outside; segments 4.5-7.5 mm. long, triangular, acute. Staminal column glabrous; capitulum of anthers subglobose. Female flowers: Peduncles 1.3-2.5 cm. long. Staminodes 3, subulate, 3 mm. long. Ovary fusiform, glabrous, slightly ribbed. Fruit fusiform-ellipsoid, slightly beaked, 2.5-5 by 1.3-2.5 cm., marked when immature with white streaks, bright scarlet when fully ripe. Seeds somewhat obovoid, rounded at the apex, slightly papillose, much compressed, yellowish grey.

Distribution: Throughout India and Ceylon.—Malaya, tropical Africa.

1. *Sweet variety:*—The root is cooling, aphrodisiac; stops vomiting, urinary losses, burning of hands and feet; given for uterine discharges.—The leaves are sweet, acrid, cooling, astringent to the bowels; cure " kapha " and " pitta "; cause flatulence.—The flowers cure itching, biliousness, and jaundice.—The fruit has flavour; indigestible, causes flatulence; cooling, astringent to the bowels, galactagogue, antipyretic; cures leprosy " vata ", burning sensation of the body, bronchitis, asthma, consumption, jaundice, diseases of the blood, inflammations due to " pitta " derangement.— 2. *Bitter variety:*—The fruit is bitter, pungent; wholesome, laxative, alexiteric, emetic; cures " kapha ", biliousness, foul breath and bad taste, bronchitis, leprosy, anæmia, inflammations, diseases of the blood; increases " vata " (Ayurveda).

The fruit is aphrodisiac; allays thirst; useful in biliousness and diseases of the blood (Yunani).

The expressed juice of the thick tap-root of this plant is used by Indian physicians as an adjunct to the metallic preparations prescribed by them in diabetes.

In the Konkan, the root pounded with the juice of the leaves is

applied as a *lep* to the whole body to induce perspiration in fever, the green fruit is chewed to cure sores on the tongue.

The bark of the root, dried and reduced to powder, is said to act as a good cathartic, in a dose of 30 grains (Taylor).

The leaves are applied externally in eruptions of the skin, and the plant internally in gonorrhœa (Balfour).

The leaves, mixed with *ghi*, are applied as a liniment to sores. The whole plant, bruised and mixed with the oil of *Euphorbia neriifolia* and powdered cumin seeds, is administered in special diseases (Atkinson).

Among the Mundas of Chota Nagpur the sap of this plant, mixed with mustard oil and water, is used as a remedy for earache, a few drops being poured into the ear which is then plugged with cotton. The cooked leaves are considered very useful in diabetes.

The plant has the reputation in Bengal of having a remarkable effect in reducing the amount of sugar in the urine of patients suffering from diabetes mellitus. The fresh juice extracted from the roots and leaves, either by itself or in combination with certain metallic preparations, is given in the treatment of diabetes.

The plant contains an enzyme with amylolytic properties, a hormone, and traces of an alkaloid. None of these substances reduces sugar when administered subcutaneously to rabbits. Fresh juice extracted from the leaves, stem, and root of the plant produces no reduction of sugar in the blood or urine of patients suffering from glycosuria (Chopra and Bose; *Ind. Journ. Med. Research*, XIII, 1925-26).

The leaves of this plant are boiled in gingelly oil and applied externally in ringworm, psoriasis, itch, etc. The oil is also used as an application to ulcers, and as an injection into chronic sinuses. Internally the decoction of the leaves and stem is said to be expectorant, antispasmodic, and useful in bronchial catarrh and bronchitis. I have not found either in the oil or the decoction any of the properties mentioned above (Koman).

The fruit (Sushruta, Bapat) and the leaves (Roberts) are prescribed in the treatment of snake-bite. The fruit is also recommended for scorpion-sting (Sushruta).

The fruit is useless in the antidotal and symptomatic treatment of snake-bite; the fruit and the leaves are useless as an external application (Mhaskar and Caius). The fruit is not an antidote to scorpion-venom (Caius and Mhaskar).

Arabic: Kabarehindi—; *Bengal:* Bimbu, Telakucha—; *Bombay:* Bhimb, Rantondla, Tendli, Tenduli—; *Burma:* Kenbung, Tsathakhwa—; *Canarese:* Tondeballi—; *Gujerati:* Galedu, Galludda, Ghobe, Gluru—; *Hasada:* Hatukunduru, Kunduru—; *Hausa:* Gurjin daji—; *Hindi:* Bhimb, Kanduri, Kunderi—; *Indo China:* Day him bat, Dom ac ngu chia, Hoa lat, Qua manh vat, Rau manh bat—; *Konkani:* Pendli, Tendulem—; *Malay:* Pepasan—; *Malayalam:* Gwel, Kova, Kwel—; *Marathi:* Bimbi, Kondvalli, Tendli, Tondali, Zidadi—; *Mundari:* Hatukunduru, Kunduru—; *Naguri:* Hatukunduri, Kunduri—; *Persian:* Kabarehindi, Kundrus—; *Punjab:* Ghol, Kanduri, Kundru—; *Sanskrit:* Bimba, Bimbaka, Bimbi, Bimbika, Chhardini, Dantachhadopama, Govhi, Jhundikeshi, Kamboja, Karmmakari, Katubimbi, Katuka, Katutundika, Oshthi, Oshtopamaphala, Piluparni, Raktaphala, Ruchiraphala, Tiktabimbi, Tiktakhya, Tiktatundi, Tundi, Tundika, Tundikeri, Tundiparyyayaga, Vimba—; *Sind:* Golaru, Kanduri—; *Sinhalese:* Kovaka—; *Tamil:* Kovai, Kwai—; *Telugu:* Bimbika, Dondatiga, Kaidonda, Kakidonda—; *Uraon:* Kundri—; *Urdu:* Kundaru—.

CUCURBITA Linn.

Large climbing herbs, annual or perennial, hispid or hairy. Tendrils 2-4-fid. Leaves petioled, cordate, ovate, 5-angular or lobed. Flowers monoecious, all solitary, yellow, large. Male: Calyx-tube campanulate; lobes 5, linear or foliaceous. Corolla campanulate, 5-lobed hardly half-way down. Stamens 3, inserted low in the calyx-tube; anthers connate, one 1-celled, two 2-celled, cells conduplicate. Female: Calyx and corolla as in the male. Ovary oblong, style short, stigmas 3, bifid; ovules very many, horizontal, placentas 3. Fruit fleshy, indehiscent, often large. Seeds ovoid or oblong, compressed, margined or not.—Species 10.—American, but several so long cultivated that their origin is doubtful.

1. Leaves with 5 shallow lobes or subentire, sinus between the lobes narrow .... 1. *C. maxima.*
2. Leaves 5 lobed, sinus between the lobes broad .... 2. *C. pepo.*

The seeds and leaves are mostly used as poultices. The seeds are credited with anthelmintic properties.

The following species are used medicinally in Europe, Guinea, Brazil—*C. maxima* Duch., *C. pepo* Linn.—; in China, Cambodia, and Malaya—*C. pepo* Linn.—; in Indo China and Guiana—*C. moschata* Duch.

OFFICIAL:—The seeds of *C. citrullus* Linn.=*Cucumis Citrullus* Seringe (Portugal); *C. maxima* Duch. (France, Great Britain); *C. maxima* Duch.=*C. Potiro* Pers. (Portugal); *C. Pepo* Linn. (Portugal, United States); *C. Pepo* Duch. (France).

The pulp of the fruit of *C. lagenaria* Linn. var. *teres oblonga* Brot.=*Lagenaria vulgaris* var. *Cougourda* Seringe (Portugal).

1. **Cucurbita maxima** Duchesne; Lam. Encycl. II (1786) 151. —PLATE 462B.

Leaves nearly orbicular in outline and not pointed or much lobed, but with deep sinus at base. Corolla prevailingly with soft obtuse more or less crinkly revolute or hanging lobes, the tube with parallel sides or bulging at base; peduncle short, spongy, nearly cylindrical, not expanded at attachment to fruit.

Distribution: Cultivated throughout India and in most warm regions of the world.

The fruit has flavour; diuretic, tonic; allays thirst; cures "kapha"; indigestible; increases "vata"; causes biliousness and loss of appetite (Ayurveda).

The seeds are used as a tæniacide. The oil is prescribed as a nervine tonic.

The pulp of the fruit is often used as a poultice.

The seeds are an old popular remedy for tape-worm in Malta, generally considered as very effective and safe.

In Guinea, the fruit is considered sedative, emollient, and refrigerant. The pulp is applied to burns and scalds, inflammations, abscesses, and boils; it is also prescribed in migraine and neuralgia. The seeds are used as anthelmintics, more especially as tæniacides.

The Red Gourd is prescribed by Vagbhata in combination with other drugs as an antidote to scorpion-venom. The fruit stalk in *immediate* contact with the ripe gourd is a popular remedy; it is removed and dried, when required it is made into a paste by rubbing in water and applied to the sting.

No part of the gourd is an antidote to scorpion-venom (Caius and Mhaskar).

The oil from the seeds has been examined for its constants (*Agricultural Ledger*, 1911-12).

Banda: Chuchu, Saimbere, Sevi—; *Bengal:* Saphurikomra—; *Bombay:* Lalbhopali, Laldudiya—; *Brazil:* Aboboreira grande, Jurumu, Moranga—; *Burma:* Shwepayon—; *Canarese:* Kumbala—; *Deccan:* Mithakaddu—; *Dutch:* Pompoen—; *English:* Melon Pumpkin, Red Gourd, Squash Gourd—; *French:* Bonnet d'électeur, Courge, Courge potiron, Potiron, Potisson, Poturon—; *Fulah:* Budi—; *German:* Reisenkuerbis, Speisekuerbis—; *Gujarat:* Koron—; *Hindi:* Kadu, Mithakaddu—; *Hova:* Voatavo, Voatavohoka—; *Italian:* Cucuzza—; *Kangra:* Tookmkudu—; *Konkani:* Dudi, Dudni—; *Languedoc:* Corcoita—; *La Reunion:* Citrouille du Cap—; *Madras:* Perumpusuni—; *Malayalam:* Mattanga—; *Malinke:* Guie—; *Manjia:* Chuchu puru ngato—; *Mexico:* Calabaza, Tamalayota, Tamalayotli—; *Moldavia:* Bostan—; *Mundari:* Bondeakakaru, Kakaru, Kakru—; *New Caledonia:* Kavepoaka—; *North-Western Himalayas:* Gaduwa—; *Portuguese:* Abobora amarella, Abobora do telhado—; *Roumanian:* Curcubata, Dovieae—; *Russian:* Kruglayia tikva—; *Sanskrit:* Dangari, Gramya, Gudayogaphala, Kushmanda, Pitakushmanda, Pitaphala, Pitapushpa—; *Sinhalese:* Kumbala, Ratalabu, Wattaka—; *Soussou:* Nalingni—; *Spanish:* Calabaza—; *Tagalog:* Calabazangbilog, Calabazangpula—; *Tamil:* Pushini—; *Telugu:* Gummadi—.

2. **Cucurbita pepo** Linn. Sp. Pl. (1753) 1010.—*Pepo vulgaris* et *P. verrucosus* Moench Meth. Pl. (1794) 653.—PLATE 463.

Stems and leaves with a harsh prickly armature. Foliage stiff, more or less rigid, erect. Leaves with a broad triangular-pointed outline and often with deep lobes. Corolla mostly with erect or

spreading (not drooping) pointed lobes, the tube narrowing towards the base. Peduncle strongly 5-angled and little or much expanding near the fruit.

Distribution: Considered to be a native of America. Cultivated in many parts of India.

The fruit is cooling; astringent to the bowels; increases appetite; cures leprosy, "kapha" and "vata", thirst, fatigue; purifies the blood (Ayurveda).

The leaves are digestible, hæmatinic, analgesic; remove biliousness.—The fruit is sweetish; very cooling; laxative; good for teeth, throat, eyes; allays thirst.—The rind is used in piles and applied to wounds.—The seeds are sweet; diuretic, tonic, fattening; cure sore chests, hæmoptysis, bronchitis, fever; allay thirst; good for the kidney and the brain (Yunani).

The leaves are used as an external application for burns.

The seeds are considered anthelminitc.

The seeds are largely used for flavouring certain preparations of Indian hemp, and the root for a nefarious purpose, *viz.*, to make the preparation more potent.

In Guinea, the plant is considered to have the same medicinal properties as *C. maxima.* In Cambodia, the juice is given in smallpox.

In Malaya, a decoction of the roots is administered to control uterine hæmorrhage resulting from the use of abortifacients.

The seeds are tæniacide, diuretic, and demulcent. It has long been a popular worm remedy in Europe.

The oil from the seeds has been examined for its constants (*Agricultural Ledger*, 1911-12).

Annam: Bi ngo—; *Arabic:* Kurah—; *Banda:* Chuchu—; *Bengal:* Kadimah, Konda, Kumara, Kumra, Lanka, Safedkaddu—; *Bombay:* Kaula—; *Brazil:* Abobreira das Aboboras meninas—; *Cambodia:* Ropeou, Tralach—; *Canarese:* Kumbala—; *Chinese:* Lan Koua, Nan Kua—; *Dutch:* Pompoen—; *English:* Pompion, Pumkin,

Vegetable Marrow—; *French:* Citrouille, Giraumon, Pepon—; *Fulah:* Budi—; *Ga:* Sakribonte—; *German:* Feldkuerbis, Kuerbis, Mandelkuerbis, Pepone, Pfebenkuerbis, Plutgen—; *Gujarat:* Dudia—; *Hindi:* Kadimah, Konda, Kumra, Safedkaddu—; *Hova:* Tavo, Voatombazaha—; *Hungarian:* Tok—; *Indo China:* Bi ngo, Kim qua—; *Italian:* Zucca—; *Kangra:* Patha—; *Kano:* Kabewa, Ruguguwa—; *Konkani:* Bobrini, Bobro, Concondudi, Cunvala—; *Kumaon:* Bhunja, Kumhra, Petha—; *La Reunion:* Citrouille du pays—; *Madagascar:* Tsirebika—; *Malay:* Akar labu ayer—; *Malinke:* Guie—; *Manjia:* Chumba, Saekara, Saezembe—; *Marathi:* Kohala—; *Mexico:* Calabaza comun, Calabaza india, Iztacayotli, Iztactzilacayotli—; *Mundari:* Kakaru, Kakru, Pilikakaru—; *New Caledonia:* Kave—; *North-Western Himalayas:* Bhunga, Petha—; *Orissa:* Panikakharu—; *Persian:* Kaduedaraz—; *Philippines:* Calabaza—; *Polish:* Bania, Dynia—; *Portuguese:* Abobora d'agua, Aboboreira, Coalenga, Cucurbita—; *Roumanian:* Dovleac—; *Russian:* Tikva—; *Sakalave:* Balaka—; *Sanskrit:* Karkaru, Kurkaru, Kushmandi—; *Sokoto:* Kabushi, Kubewa—; *Soussou:* Nalingni—; *Spanish:* Calabaza—; *Swedish:* Pompa—; *Telugu:* Budadegummadi, Pottigummadi—; *Twi:* Airfere—; *Urdu:* Luki—; *Zaria:* Gofi—.

Bryonopsis Arn.

Annual scaberulous scandent herbs. Tendrils 2-fid. Leaves deeply palmately 5-lobed. Flowers monoecious, the male and female fascicled, often in the same axils. Male flowers: Calyx-tube broadly campanulate; lobes 5, subulate. Corolla campanulate, 5-partite; segments ovate. Stamens 3, free, inserted on the calyx-tube; filaments short; anthers cohering, one 1-celled, the others 2-celled; cells flexuose round the broad connective, which is not produced at the apex. Pollen muriculate. Rudimentary ovary 0. Female flowers: Calyx and corolla as in the male. Staminodes 3, small. Ovary globose or ovoid, 3-placentiferous; ovules numerous, horizontal; style slender; stigmas 3, papillose, deeply 2-lobed. Fruit baccate, spherical or ovoid-conical, pulpy, many-seeded. Seeds subpyriform, very turgid, surrounded by a very thick grooved crenulate ring, on each

side of which the tumid faces of the seed project.—Species 2.—Tropical Africa, Asia and Australia.

B. laciniosa Neud. is credited with medicinal properties.

1. **Bryonopsis laciniosa** Naud. in Ann. Sc. Nat. sér. 4, XVIII (1862) 194.—*Bryonia laciniosa* Linn. Sp. Pl. (1753) 1013; Wight Ic. t. 500.—PLATE 464 (under *Bryonia laciniosa*).

Stems much-branched, slender, grooved, glabrous. Tendrils slender, striate, glabrous, 2-fid. Leaves membranous, 10-15 cm. long and about as broad, green and scabrid above, paler and smooth or nearly so beneath, deeply cordate at the base, 5-lobed, the lobes oblong-lanceolate (the middle sometimes reaching 10 cm. long), the margins sinuate, distantly denticulate, sometimes subserrate; petioles 2.5-7.5 cm. long, striate, slender. Male flowers in small fascicles of 3-6; peduncles 5-20 mm. long, filiform, glabrous. Calyx glabrous, 2.5 mm. long; teeth subulate, less than 1.25 mm. long. Corolla 3-4 mm. long; segments ovate-oblong, acute, pubescent. Female flowers solitary, or few, or many; peduncles shorter than in the male. Fruit subsessile, 1.3-2.5 cm. diam., globose, smooth, bluish green streaked with broad vertical lines. Seeds 5-6 mm. long, yellowish brown.

Distribution: Throughout India from the Himalaya to Ceylon.—Mauritius, tropical Africa, Malaya, Philippinnes, Australia.

The plant has a bad smell; hot, pungent; alterative.—The leaves are applied topically to inflammations (Ayurveda).

The whole plant is collected when in fruit. It is bitter and aperient, and is considered to have tonic properties.

Bengal: Mala, Shivalingani—; *Bombay:* Kawala—; *Gujerati:* Shivalingi—; *Hasada:* Huringkaupudki—; *Hindi:* Gargumaru, Ishwaralingi, Shivalingi—; *Malayalam:* Neohmaka—; *Marathi:* Shivalingi, Vaduballi—; *Mundari:* Kauasangga, Merommednari—; *Naguri:* Hudingkaubutuki—; *Sanskrit:* Apastambhini, Bahupatra, Bakapushpa, Chandra, Chitraphala, Devi, Ishwari, Lingaja, Lingasambhuta, Lingi, Lingini, Pandoli, Shaivamallika, Shivaja, Shivavalli, Svayambhu, Tutthini—; *Telugu:* Lingadonda—.

Melothria Linn.

Slender scandent or prostrate herbs, annual or with a perennial root, monoecious or very rarely dioecious. Tendrils simple, rarely bifid. Leaves usually membranous, entire or more or less lobed. Flowers small, yellow or white. Male flowers racemose or corymbose, less commonly fascicled or solitary. Calyx campanulate, 5-toothed. Corolla deeply 5-partite; segments entire. Stamens 3, inserted on the tube (rarely at the base) of the calyx; filaments free; anthers free or rarely slightly cohering, one 1-celled, the others 2-celled or sometimes all 2-celled, the cells straight, rarely curved, the connective sometimes produced. Rudimentary ovary globose or annular, rarely 3-lobed. Female flowers solitary, fascicled, or corymbose. Calyx and corolla as in the male. Staminodes 3 or 0. Ovary ovoid, globose or fusiform, 3-placentiferous, constricted beneath the flower; ovules usuallly numerous, horizontal; style short, surrounded at the base by an annular disk; stigmas 3, linear, rarely 2, or stigma 3-lobed. Fruit small, baccate, globose, ovoid or fusiform, usually many-seeded. Seeds ovoid or ellipsoid, compressed, usually margined, smooth or rarely scrobiculate.—Species 85.—Warmer regions of the globe.

A. Monoecious
   1. Stems scandent or prostrate, very hispid .... 1. *M. maderaspatana.*
   2. Stems deeply striate, glabrous .... 2. *M. perpusilla.*
B. Dioecious .... 3. *M. heterophylla.*

The following species are used medicinally in Indo China—*M. heterophylla* Cogn.—; in Guiana and Brazil—*M. pendula* Linn.—; in South Africa—*M. punctata* (Thunb.) Cogn., *M. velutina* Cogn.—; in Madagascar—*M. rutembergiana* Cogn.—; in Abyssinia—*M. scrobiculata* Cogn.—.

1. **Melothria maderaspatana** (Linn.) Cong. in DC. Monogr. Phan. III (1881) 623.—*Mukia scabrella* Arn. in Hook. Journ. Bot. III. (1841) 276; Wight Ill. II (1850) t. 105.—Plate 465 (under *Mukia scabrella* Arn.).

Annual, monoecious; stems scandent or prostrate, slender, much-branched, angular, very hispid; young parts densely covered with

white hair. Tendrils simple, striate, sparingly hirsute. Leaves variable in size, 2.5-12.5 by 2.5-10 cm., deltoid-ovate, entire, 5-angled or 3-5-lobed, very scabrid above, scabrid or shortly hispid beneath, acute at the apex, cordate at the base with a wide sinus, the lobes often overlapping, the margins dentate or subserrate; petioles 6-25 mm. long, hairy. Male flowers in small fascicles on very short peduncles. Calyx hairy; tube 2 mm. long, narrowly campanulate; teeth about 1.25 mm. long, subulate. Corolla pubescent; segments ovate-oblong, rounded a the apex, 2 mm. long. Female flowers almost sessile. Fruit the size of a pea, smooth or slightly echinulate, at first green and variegated with yellow, finally wholly red. Seeds ellipsoid, compressed, not or scarcely margined, scrobiculate on both faces.

Distribution: Throughout India, Ceylon.—Africa, Malaya, Australia.

The seeds in decoction are sudorific. The root, similarly prepared, is useful in flatulence, and, when masticated, relieves toothache.

The tender shoots and bitter leaves are used as a gentle aperient and recommended in vertigo and biliousness.

In Chota Nagpur, the Mundas apply the crushed seeds on aching bodies, especially on strained backs.

This drug enters into some of the compound preparations for chronic diseases in which cough is a predominant symptom, probably on account of its expectorant properties. It was administered to cases of bronchitis and asthma, but the action was found to be slow and unsatisfactory (Koman).

Burma: Sathakhiva, Thabwotkha—; *Hausa:* Gautan zomo, Malami, Malami na mata—; *Hindi:* Agumaki, Bilari—; *Kumaon:* Agumarki, Bilari, Gwalakakri—; *Malayalam:* Mukkalpiram—; *Mundari:* Huringkaubutuki, Japaputus, Jhajinari, Kauasangga, Kaubutuki, Merommed—; *North-Western Provinces:* Gwalakakri—; *Sind:* Bellari, Chirati—; *Tamil:* Musimusikkayi, Musumusukkai—; *Telugu:* Kutarubudama, Pottibudamu, Putribudinga—.

2. **Melothria perpusilla** Cogn. in DC. Monogr. Phan. III (1881) 607.—*Zehneria Hookeriana* Arn. in Hook. Journ. Bot. III

(1841) 275.—*Bryonia mysorensis* Wight Ic. t. 758.—PLATE 466A (under *Zehneria Hookeriana* Arn.).

Monoecious, climbing; root an oblong flattened tuber; stems deeply striate, glabrous. Tendrils simple, striate, glabrous. Leaves broadly ovate in outline, 4.5-9 cm. long and as broad or sometimes broader than long, acute or shortly acuminate and mucronate at the apex, usually 5-angled, the angles at the base rounded, the margins distantly toothed, the upper side usually rough with scabrous spots, the lower side smooth and prominently veined, base subcordate or nearly truncate; petioles 2-2.5 cm. long. Male flowers 3-10 at the apex of a peduncle, 1.9-4.5 cm. long, capitate or in subumbellate racemes; pedicels short, filiform. Calyx-tube 1.25-1.5 mm. long, campanulate, rounded at the base; teeth very short, recurved. Corolla pale yellow; segments 1.9 cm. long, ovate-oblong, subacute, slightly hairy within the throat. Filaments hairy. Female flowers solitary or rarely subumbellate; peduncles 6-8 mm. long, in the same axils as the males. Ovary globose. Fruit smooth, globose, minutely pitted, red when ripe, 1-1.3 cm. diam. Seeds many, much flattened, smooth.

Distribution: Upper Gangetic Plain, Nepal, E. Bengal, E. Himalaya up to 5,000 ft., Assam, Khasia, Konkan, Deccan, W. Ghats, Ceylon.—Malaya, Africa.

The root is used with milk in fever and for diarrhœa.

Chota Nagpur: Bankundri—.

3. **Melothria heterophylla** Cogn. in DC. Mon. Phan. III. (1881) 618—*Zehneria umbellata* Thw. Enum. 125.—PLATE 466B (under *Zehneria umbellata* Thw.).

Dioecious; root perennial, consisting of several tubers; stems slender, branched, furrowed, glabrous. Tendrils simple. Leaves 7.5-15 cm. long, polymorphous, regularly ovate, or 3-5-angled or lobed, or hastate, acute or acuminate, usually cordate at the base, generally scabrid and pale green above, paler or cinereous and reticulately veined beneath, margins remotely denticulate; petioles 6-10 mm. long, pubescent. Male flowers subumbellate, 15-20 on a peduncle 6-20 mm. long; pedicels filiform, 3-8 mm. long. Calyx glabrous; tube campanulate, rounded at the base, 4-6 mm. long;

teeth minute, subulate. Corolla small, yellowish white; segments triangular, acute, 1.5 mm. long. Filaments slender, subglabrous, 3 mm. long. Female flowers: Peduncles solitary, 6-1.3 mm. long. Ovary narrowly oblong, glabrous or more or less pubescent, 10-ribbed. Fruit 3.8-5 cm. long, oblong-ovoid, cylindric, tapering towards the apex, ribbed, bright red when ripe. Seeds obovoid or subglobose, scarcely compressed, smooth, white.

Distribution: Throughout India, Ceylon.—China, Cochin-China, Java.

In the Konkan, the juice of the root with cumin and sugar is given in cold milk as a remedy for spermatorrhœa, and the juice of the leaves is applied to parts which have become inflamed from the application of the marking-nut juice. As a *Paustik*, or restorative and fattening medicine, roasted onions, Gometta root, cumin, sugar and ghi are given, or Gometta only with milk and sugar.

In Indo China, the seeds are used as a purgative.

Bengal: Kudari—; *Bombay:* Gametta, Gometta, Gometti—; *Chamba:* Bankakra—; *Hindi:* Amantmul—; Tarali—; *Indo China:* Hoa bat—; *Kullu:* Gulakri, Gulalekukri, Gulkukru—; *Mundari:* Birkunduru, Cenggorodsangga, Karakataear, Dindakunduri—; *Naguri:* Birkunduri—; *Santal:* At—; *Telugu:* Tiddanda—.

BLASTANIA Kotschy & Peyr.

Prostrate or scandent annual herbs. Tendrils simple. Leaves digitately 5-7- lobed or -partite. Bracts stipuliform, in the axils of the leaves, toothed or pectinately ciliate. Flowers minute, monoecious. Male flowers racemose, on slender pedicels. Calyx-tube short, campanulate; lobes 5, subulate, very small. Corolla rotate, deeply 5-partite. Stamens 3, inserted on the calyx-tube, free; filaments remote, very short; anthers small, one 1-celled, the others 2-celled, the cells short, straight, the connective not produced. Rudimentary ovary 0. Female flowers solitary, in the same axils as the males; peduncle short. Calyx and corolla as in the male. Staminodes 0. Ovary ovoid, 2-3-placentiferous; ovules few, horizontal; style columnar, without a basal disk; stigmas 2 (rarely 3).

Fruit fleshy, globose or obliquely subquadrate. Seeds few, ovoid, much compressed or boat-shaped, the margins obtuse or acute; testa smooth.—Species 3.—Tropical Africa and Asia.

The genus is therapeutically inert.

1. **Blastania garcini** Cog. in DC. Monogr. Phan. III (1881) 629.—*Ctenolepis Garcini* C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 629.

Climbing; stems slender, elongate, striate, branched, glabrous. Tendrils capillary. Leaves membranous, 2.5-5 cm. long and broad, at first hirsute, afterwards scabrid with white spots, deeply 3-5-lobed, the lobes usually obovate, obtuse or acute, constricted at the base, denticulate or crenulately toothed, the intermediate lobe scarcely longer than the others, mucronate; petioles 1.3-3.8 cm. long, slender, striate, shortly hirsute, at length scabrid. Stipular bracts 4-8 mm. long, ovate or rotundate, shortly hairy, fringed on the margin with long filiform cilia. Male flowers yellowish white, 3-4 at the apex of a slender peduncle less than 13 mm. long; pedicels 1-2 mm. long. Female flowers solitary on very short peduncles. Fruit broader than long, 4-6 by 8-10 mm., bright red, glabrous, inversely subreniform or hammer-shaped. Seeds 6-8 by 3 mm., oblong, yellowish grey, rounded at the apex, slightly attenuated at the base, with a deep pit on one face, convex on the other, the edge thick and obtuse.

Distribution: N. Circars, Deccan and Carnatic, extending westwards to the Ghats, Ceylon.

The fruit, seeds, and roots are used in medicine (Atkinson).

Ceylon: Mochumochukkay—; *Telugu:* Gudimuralu—.

KEDROSTIS Medic.

Prostrate or scandent herbs; root perennial. Tendrils simple. Leaves entire or lobed. Flowers small, monoecious (rarely dioecious). Male flowers racemose or corymbose. Calyx-tube campanulate, usually glabrous within; lobes 5, short. Corolla rotate, 5-partite. Stamens 3 (rarely 5), inserted in the calyx-tube; filaments short, glabrous; anthers short, glabrous, one 1-celled, the other 2-celled (or when 5, all 1-celled), free or slightly cohering, the cells straight

or slightly curved, the connective usually 2-fid or 2-partite, produced beyond the cells. Rudimentary ovary 0 or glanduliform. Female flowers subsessile, solitary or aggregated, shortly pedicelled. Calyx and corolla as in the male. Rudimentary stamens 0 or 3, very small. Ovary usually ovoid, beaked, 2-3-placentiferous; ovules few, horizontal; style sometimes obscurely surrounding by a disk at the base; stigmas 2 or 3. Fruit baccate, ovoid, usually rostrate. Seeds usually few, tumid, margined; testa usually crustaceous, smooth.—Species 27. —Tropical and subtropical Africa and Asia.

The genus is therapeutically inert.

1. **Kedrostis rostrata** Cogn. in DC. Monogr. Phan. III (1881) 636.—*Rhynchocarpa foetida* C. B. Clarke in Hook. f. Fl. Brit. Ind. II (1879) 627 (partim, non Schrad.)—PLATE 467A (under *Rhynchocarpa foetida*).

Scandent, monoecious; stems slender, branched, angled, sparsely hairy. Tendrils simple, filiform, glabrous. Leaves 2-5 cm. long and as broad as long, membranous, orbicular in outline, bright green, hairy and more or less scabrid on both sides, margins entire or distantly toothed, cordate at the base, sometimes 5-angled or sub-lobate, the lobes subacute, apiculate; petioles 1.3-3.8 cm. long, hairy. Male flowers: Peduncles filiform, 6-20 mm. long, 2-4-flowered at the apex; pedicels capillary, 2.5-6 mm. long, usually bracteolate at the base. Calyx hairy; tube campanulate, rounded at the base; teeth minute. Corolla pale yellow; segments oblong-lanceolate, acute, 4-5 mm. long, pubescent. Female flowers: peduncles 1.25-8 mm. long. Ovary oblong, beaked, pubescent. Fruit subsessile, deep red, about 2.5 cm. long, ovoid, tapering into a long narrow beak, pubescent. Seeds 4 mm. long, ovoid, with a narrow sharp wing, brown.

Distribution: Gujarat, Konkan, S. M. Country, Malabar, Deccan, Carnatic, Ceylon, Ava.

Ainslie says that the root is prescribed internally in electuary, in cases of piles, and in powder is sometimes ordered as a demulcent in humoral asthma.

Telugu: Kukumadunda—.

CORALLOCARPUS Welw.

Prostrate or climbing herbs. Tendrils simple. Leaves roundish or cordate, lobed or palmate. Flowers minute, monoecious. Male flowers crowded at the apex of a long peduncle. Calyx-tube broadly campanulate; lobes 5, short. Corolla 5-partite; segments ovate-oblong. Stamens 3, free, inserted on the calyx-tube; filaments very short; anthers glabrous, entire or 2-partite, one 1-celled, the others 2-celled, the cells straight, the connective produced or not, often bifid. Rudimentary ovary 0 or minute. Female flowers sessile or shortly pedicelled, solitary or fascicled, sometimes subspicate. Calyx and corolla as in the male. Rudimentary stamens 0 or minute. Ovary ovoid, beaked, 2-3-celled; ovules few, horizontal; style straight, without a basal disk; stigma 3- (rarely 2-4-) lobed. Berry fleshy, ovoid or ellipsoid, rostrate or obtuse, operculately dehiscent near the base. Seeds few, obovoid or subglobose, tumid.—Species 34.—Tropical Africa, India.

Therapeuticaaly this genus is of very little importance.

1. **Corallocarpus epigeous** (Rottl. & Willd.) C. B. Clarke in Hook f. Fl. Brit. Ind. II (1879) 628.—*Bryonia epigaea* Wight Ic. t. 503.—PLATE 461A.

Prostrate or climbing, monoecious; root large, turnip-shaped; stem slender, grooved, zigzag, glabrous. Tendrils simple, slender, glabrous. Leaves suborbicular in outline, 2-7.5 cm. long, usually a little broader than long, light green above, paler beneath, shortly roughly hairy on both surfaces, deeply cordate at the base, angled or more or less deeply 3-5-lobed, the lobes usually lobulate and obtuse, sometimes apiculate, more or less irregularly dentate on the margins; petioles 2-3.8 cm. long, glabrous. Male flowers small, 5-15 at the apex of a straight stiff glabrous peduncle 3.8-6.3 cm. long; pedicels filiform, 1-2 mm. long. Calyx slightly hairy; tube 1.5 mm. long, slightly rounded at the base; teeth minute, erect, distant, subulate. Corolla greenish yellow, segments 1 mm. long. Anthers yellow; connective green, produced beyond the cells, bifid. Female flowers usually solitary; peduncles short, stout, glabrous. Fruit stalked,

1.3-2.5 cm. long (including the beak) ellipsoid or ovoid, suddenly contracted into a slender beak 6 mm. long, scarlet in the middle, the base and beak green, circumscissilely dehiscent at the junction of the green and red portions near the base. Seeds 6-9, in orange-coloured pulp, pyriform, 3-4 by 2-2.5 mm., turgid, brown, with a whitish corded margin.

Distribution: Punjab, Sind, Gujerat, Rajputana, Deccan, S. M. Country, Carnatic; Ceylon.

The plant is bitter, sweet, alexipharmic, emetic; cures inflammations (Ayurveda).

Ainslie remarks that the Vytians hold it in great estimation, and prescribe it in the later stages of dysentery, and old venereal complaints. It is usually adminstered in powder, the dose being about one drachm in 24 hours, and continued for eight or ten days together; this quantity produces one or two loose motions. It is also considered anthelmintic. For external use in chronic, rheumatism, it is made into a liniment with cumin seed, onion and castor oil. In the Deccan and in Mysore, the root has a repute as a remedy for snake-bite; it is administered internally, and applied to the bitten part.

The root of this creeper is said to possess alterative and laxative properties. It is usually given in syphilitic rheumatism and later stages of dysentery. A decoction of the powdered root was given to cases of chronic mucous enteritis and dysentery. The cases of mucous enteritis derived considerable benefit from its use. The decoction did not do any good in cases of acute dysentery (Koman).

The root is useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Arabic: Azanulfil—; *Bombay:* Karwinai—; *Canarese:* Akashagarudagadde—; *Deccan:* Garajphal, Rakkasgaddah—; *Gujerati:* Kadvinai, Nahikunda—; *Hindi:* Akasgaddah, Rakasgaddah—; *Las Bela:* Golanarum—; *Malayalam:* Kadamba, Kollankova—; *Marathi:* Kadavinai—; *Persian:* Lufa—; *Sanskrit:* Katunahi—; *Sinhalese:* Gopalanga—; *Tamil:* Akashagarudan,, Gollankovai—; *Telugu:* Murudonda, Nagadonda—.

ZANONIA Linn.

Scandent glabrous or pubescent shrubs. Tendrils simple or bifid. Leaves petiolate, ovate or oblong, entire. Flowers dioecious, all racemose or the males panicled. Male flowers: Sepals 3, broadly oblong or orbicular, membranous, concave. Corolla rotate, 5-partite, coriaceous or fleshy; the segments narrowed at the apex. Stamens 5, free, inserted on a fleshy disk; filaments very short and thick; anthers transversely oblong, adnate to the filaments, 1-celled. Rudimentary ovary 0. Female flowers: Calyx and corolla as in the male. Staminodes very short, alternate with the petals. Ovary elongate, at first 3-celled at length 1-celled by the absorption of the septa; ovules 2-many in each cell, attached to both sides to parietal placentæ, pendulous. Fruit cylindric, clavate or hemispheric, terete or subtrigonous, truncate and broadly 3-valved at the apex. Seeds large, pendulous, oblong, compressed, imbricate, surrounded by a large membranous wing.—Species 1.—Tropical Asia.

1. **Zanonia indica** Linn. Sp. Pl. ed. 2 (1763) 1457; Wight Ill. t. 103.—PLATE 468.

Scandent, climbing to a height of 9-15 m. Stems stout, cylindric, striate, woody, glabrous. Tendrils elongate, terete, glabrous. Leaves coriaceous, deciduous (leaving a prominent circular scar), 7.5-15 by 5-10 cm., ovate-oblong, acute, entire, bright green and glabrous above, paler and conspicuously reticulate beneath, 3-nerved from a rounded or slightly cordate base; petioles 1.6-3.2 cm. long, stout, glabrous. Male flowers in racemes or panicles 15-30 cm. long, on slender grooved glabrous peduncles; pedicels somewhat stout, articulated about the middle, 2-4 mm. long, bracteolate at the base. Sepals 2 mm. long, ovate, acute, concave, glabrous. Petals greenish yellow, oblong, obtuse, 4 mm. long, 2 mm. broad at the base. Female flowers in 5-12-flowered racemes 10-30 cm. long. Sepals broadly triangular, 4 mm. long. Petals ovate-oblong, 6-8 mm. long. Ovary cylindric, 1-3 cm. long. Capsule in shape like a candle-extinguisher, 5-10 cm. long, cylindric-obconic, slightly tapering towards a rounded base, truncate at the apex, glabrous, pale yellowish brown. Seeds much compressed, 2 by 1 cm., pale yellow smooth;

the wing 5-6.3 cm. long by 1.3 cm. broad, rounded at the base and apex.

Distribution: Assam, E. Bengal, Konkan, Deccan, Malabar, Ceylon, Malay Peninsula. —Java, Borneo, New Guinea, Malaya.

The leaves are applied topically to reduce inflammation.—The fruit is cooling and laxative; cures asthma and bronchitis; may cause fever and biliousness (Ayurveda).

The leaves, beaten up with milk and butter, are applied as a liniment in antispasmodic affections (Rheede).

The fruits are said to possess very acrid cathartic properties. Hakims assert that the fresh juice is very efficacious as an antidote to the venomous bites of the gecko (S. Arjun). The bite of the gecko is not venomous (Caius).

The Sinhalese value the plant as a febrifuge (Thwaites).

In Malabar, a bath made by boiling the leaves in water is used to remove the nervous irritation caused by boils.

Gujerati: Parpoti—; *Hindi:* Chirpotana, Chirpoti, Patakona, Shanasokha—; *Malayalam:* Penarvalli—; *Marathi:* Chirabuti, Chirapota—; *Sanskrit:* Chirpota, Dirghapatra, Jvarakarini, Kuntali, Parpoti, Phalamba, Raktahantri, Tiktaka—; *Sinhalese:* Walrasa-kinda—.

BEGONIACEAE.

Succulent herbs, sometimes shrubs; stem sometimes reduced to a rhizome or tuber. Leaves alternate, more or less inequilateral, entire, lobed or digitately partite, usually dentate; stipules 2, free, usually caducous. Flowers handsome, white or rosy (rarely yellow or red), unsymmetrical, monoecious; peduncles axillary, bracteate, divide into dichotomous 1- or 2- sexual cymes; bracts and bracteoles usually opposite. Male flowers: Perianth-segments (of the only

Indian genus) 2 or 4 in pairs, the outer pair valvate, the inner (when present) smaller. Stamens numerous, inserted on a more or less convex torus; filaments free or connate; anthers linear-oblong or clavate. Rudimentary ovary 0. Female flowers: Perianth-segments 2-5, of which the 2 exterior are larger and sepaloid. Staminodes 0. Ovary inferior, usually 3- (rarely 2- or 4-) celled; ovules numerous, crowded on axile placentæ; style 2-4, free or connate at the base; stigmas branched or tortuous. Fruit capsular, loculicidally (rarely septicidally) dehiscent, less commonly a fleshy berry breaking up irregularly, usually 3-celled and 3-gonous, often winged, more rarely 2- or 4- celled. Seeds numerous, minute; albumen scanty or 0.—Genera 4.

The members are of very little medicinal value.

BEGONIA (Tourn.) Linn.

Characters of the order.

Species 750.—Tropical and subtropical, especially American.

The genus is refrigerant. Many species are poisonous to leeches.

The following are used medicinally in South Africa—*B. sutherlandii* Hook.—; In La Reunion—*B. aptera* Roxb.—; in Brazil—*B. acetosa* Vell., *B. acida* Vell., *B. bidentata* Raddi, *B. cucullata* Willd., *B. hirtella* Link., *B. platanifolia* Schott., *B. sanguinea* Raddi, *B. undulata* Otto—.

1. **Begonia rex** Putzeys in Fl. Des. Serres t. 1255, 1256; Bot. Mag. t. 5101.

Stemless. Leaves 10-15 cm., cordate-ovoid, acute, unequal at the base, undulate, ciliate-denticulate, with a few scattered hairs above, pubescent on the nerves beneath; petiole 2.5-10 cm. with spreading hairs. Peduncle upwards, bracts, ovary and flowers glabrous. Scapes 10-23 cm., glabrous except a few hairs near the base; flowers medium, rose, not very many. Male: Sepals 2, ovate; petals 2, elliptic; stamens numerous, monadelphous, anthers obovoid; connective produced, acutely triangular. Female: Perianth-

segments 5, inner gradually smaller; styles 2, combined below, branches very tortuous. Capsule 1.3-1.6 by 2.5-3.2 cm. including the wings.

Distribution: Assam and Mishmi.

The plant is used by some of the tea-planters in Assam as a substitute for Rhubarb.

The juice is poisonous to leeches.

DATISCACEAE.

Herbs or trees, sometimes lepidote. Leaves alternate, simple or pinnate; stipules absent. Flowers male or female, dioecious or rarely hermaphrodite, actinomorphic, spicate or racemose. Male flowers: Calyx-lobes 3-9, short; petals 8 or absent, small; stamens 4-25, opposite the calyx-lobes; anthers 2-celled, opening lengthwise; rudimentary ovary small or absent. Female and hermaphrodite flowers: Calyx-tube adnate to the ovary; stamens similar to the male or reduced to staminodes. Ovary 1-celled, open or closed at the apex; placentæ parietal; styles free, simple or branched; ovules very numerous, anatropous; capsule opening amongst the styles, many-seeded. Seeds very numerous, minute, with scanty endosperm and cylindric straight embryo.—Genera 3. Species 5.—Tropics and temperate regions.

The Order has little therapeutical significance.

Datisca Linn.

Tall glabrous erect herbs. Leaves 3-partite or unequally pinnate, the uppermost undivided; leaflets lanceolate, strongly serrate. Flowers dioecious, axillary, clustered, short-pedicelled. Male: Calyx-tube very short, lobes 4-9, unequal; stamens 9-25; no rudiment

of the ovary. Female: Calyx-tube ovoid, trigonous upwards; styles 3, divided nearly to the base into 2 linear stigmas. Capsule narrow-oblong, trigonous, coriaceous, opening at the vertex between the styles. Seeds many, ellipsoid, coarsely reticulated.—Species 2. —N. America, W. Asia.

D. cannabina Linn. is used medicinally in Italy.

1. **Datisca cannabina** Linn. Sp. Pl. (1753) 1037.—Plate 469A.

A glabrous herb; stem erect, robust, 0.6-1.8 m.; branches flower-bearing, long. Stem-leaves alternate, pinnate (lower ones the larger), 15-30 cm.; leaflets 5-11, shortly stalked, lanceolate, 15 by 3.8 cm.; coarsely toothed, tip long-pointed, entire. Leaves of the branches alternate, linear-lanceolate, 2.5-7.5 cm., toothed or entire; stipules none. Flowers 1-sexual, regular, male and female on different plants, yellow, small, shortly stalked, in numerous, axillary clusters. Male flowers: Calyx-tube very short, limb 5-lobed; petals none; stamens 11-13, inserted on the calyx, anthers linear-oblong, 2-celled, nearly sessile. Female flowers: Calyx-tube ovoid, obscurely 3-angled, adnate to the ovary, limb 3-toothed; petals none; ovary inferior, 1-celled; styles 3, each divided nearly to the base in 2 linear stigmas; ovules numerous, attached to 3 placentæ on the cell-wall. Capsule oblong, 8 mm., opening at the top. Seeds numerous, minute.

Distribution: Temperate and subtropical W. Himalaya from Kashmir to Nepal, 1,000—6,000 ft., not very common.—Westward to the Levant.

The herb acts as a diuretic. It is administered in intermittents. As an expectorant it is given in catarrh.

It is bitter and purgative, and is occasionally used in fevers and in gastric and scrofulous complaints. In Khagan, the bruised root is applied to the head as a sedative.

The root acts as a sedative in rheumatism. It is applied locally to carious teeth.

Bombay: Akalbar—; *French:* Cannabine, Chanvre de Crète—; *Hindi:* Akalbir, Bhangjala, Kalbir—*Kashmir:* Waftangel—;

North-Western Provinces: Akalber, Bhangjala, Bajrjala—; *Punjab:* Akilbir, Bhangjala, Drinkhari, Ekilbir, Sidaatsu—.

CACTACEAE.

Succulent plants, the stem very various in form, very rarely with well-developed leaves, the leaves usually reduced to small scales in the axils of which is an area (areole) bearing a tuft of hairs and often prickles and bristles with barbed hairs (glochidia). Flowers showy, bisexual, usually regular, rarely zygomorphic, usually solitary and springing from the areoles, sometimes from between tubercles on the stem, rarely panicled. Sepals and petals not sharply differentiated, usually of numerous segments forming a perianth which is usually united and tubular at the base; limb salver-shaped, funnel-shaped or rotate. Stamens almost always very numerous, arising from perianth-tube, rarely from the receptacle. Ovary inferior, 1-celled; ovules usually very numerous on projecting parietal placentæ; style 1; stigmas as many as the placentæ, stellately spreading. Fruit a 1-celled more or less fleshy berry, very rarely dehiscent or in one species a circumsciss capsule.—Genera 15. Species 1,500. —Chiefly in the dry regions of tropical America.

The juice of the plant is used as an anthelmintic and a rubefacient. The fruit is laxative, antibilious, and antiscorbutic.

Some, such as ANHALONIUM, contain highly poisonous allkaloids and saponins.

Anhalamine, anhaline, anhalodinine, anhalonine, hordenine, lophophorine, mezcaline, pellotine are among the alkaloids obtained from various members.

Opuntia Tourn. ex Mill.

Shrubs with the stems often woody, branches jointed with large fleshy and compressed limbs bearing when very young small cylindri-

cal or subulate caducous leaves leaving axillary scars or " areoles " from which arise very numerous fine barbed bristles and often one or more larger prickles or spines. Flowers solitary, large moderate sized from the marginal or apical areoles, usually yellow or reddish, regular, rotate or funnel-shaped. Outer sepals sepaloid, inner numerous petaloid. Stamens shorter than the perianth, inserted on the cupular or saucer-shaped hypanthium, of which the upper part falls off with the perianth and stamens. Ovary sunk in the hypanthium (which does not differ from the rest of the axis and bears areoles, and if broken off and planted will behave like a cutting and grow!). Ovules few or very many, enveloped by the much-expanded end of the funicle.—Species 250.—America.

A. Stamens exserted .... 1. *O. coccinellifera.*
B. Stamens not exserted
  I. Spines falling except one long one on each cushion .... 2. *O. monacantha.*
  II. Several large spines remaining on each cushion
    a. Spines all straight, slender, tawny or purplish black
      1. Flowers orange .... 4. *O. nigricans.*
      2. Flowers yellow .... 3. *O. stricta.*
    b. Spines some curved, the largest stout, light horn coloured in life darkening in herbaria with age .... 5. *O. dillenii.*

The fruit is refrigerant and mildly laxative.

The following species are used medicinally in Europe—*O. ficus-indica* Haw., *O. vulgaris* Mill.—; in Brazil—*O. brasiliensis* Willd.—; in Madagascar—*O. ferox* Haw., *O. vulgaris* Mill.—; in La Reunion —*O. tuna* Mill.—; in South Africa—*O. decumana* Haw., *O. tuna* Mill., *O. vulgaris* Mill.—.

1. **Opuntia coccinellifera** Mill. Gard. Dict. ed. VIII (1768) no. 6.

Arborescent or shrubby, 3 m. high, stem 20 cm. diam. Leaves 7.5-1.5 cm. long, curved, thick, blunt. Joints 25 cm. long by 12.5 cm. broad, oblong or oblanceolate, blunt, rather thick. Areoles usually without prickles, glochidia inconspicuous. Flowers about 6.3 cm. long, red. Perianth campanulate, the outer segments short, green. Stamens much exceeding the perianth; filaments pinkish red; anthers yellow. Style exceeding the stamens; stigmas erect-patent. Berry ellipsoid, 5 cm. long, 3 cm. diam., red.

Distribution: Probably Mexico.—Introduced in India.

The fruit is emollient and bechic, refrigerant and mildly laxative.

The plant is used as a substitute for *O. dillenii.*

English: Cochineal Cactus—; *Mexico:* Nochtli, Tuna, Tuna colorada, Tuna pulquera, Tragacanto do Mexico, Tunera salvaje de Canarias—; *Tagalog:* Dilangbaca—; *Tamil:* Puchikkalli—; *Visayan:* Dapal—.

2. **Opuntia monacantha** Haw. Suppl. Pl. Succ. (1819) 81.

Shrubby, branched from the base, 1.8-2.4 m. high. Leaves dark brown, slightly recurved, 6 mm. long. Joints usually 30 by 7.5-10 cm., variable in size and shape, sometimes 75 cm. long, narrow-oblong to broad-obovate, rather thin, bright grass green. Areoles at first with one prickle or with few of which one is larger than the others, as the joints become older the number of prickles in each tuft increases up to 10; prickles straight, up to 5 cm. long; glochidia numerous. Flowers 5-6.3 cm. long, 7.5 cm. across, yellow. Perianth rotate, the outer segments short, ovate-acute, green, the inner spathulate, acute, denticulate. Stamens half as long as the inner perianth segments. Style exceeding the stamens, stigmas 5. Berry pyriform, truncate and deeply depressed at the apex, bearing tufts of glochidia on the outside, reddish when ripe.

Distribution: Indigenous to Brazil and the Argentine.—Introduced in India.

The stems are made into emollient cataplasms.

The fruit is used as a laxative.

The whole plant is a good substitute for *O. dillenii.*

Tamil: Sappattukkalli—; *Telugu:* Nagajemudu—; *Uriya:* Nagophenia—.

3. **Opuntia stricta** Haw. Syn. Pl. Succ. (1912) 191.

Shrubby, branched from the base, about 1.2 m. high. Leaves 2.5-4 mm. long, conical, green or reddish. Joints about 15 by 6.3 cm., very uniform in size and shape, elliptic-oblong, narrowed at both ends, thick, dull greyish green. Areoles usually without prickles, occasionally with 1, rarely 2 or 3 straight prickles about 2.5 cm.

long, glochidia numerous, reddish brown. Flowers 7.5 cm. across, yellow. Perianth rotate, the outer segments short, acute, green, the inner spathulate, acute. Stamens half as long as the inner perianth segments. Style exceeding the stamens; stigmas 6. Berry turbinate, depressed at the apex, slightly warty, bearing scattered tufts of glochidia, dull carmine when ripe.

Distribution: Indigenous in S. America.—Introduced in India.

The juice of the fruit is applied to indolent ulcers.

The plant is considered to have properties similar to those of *O. dillenii.*

4. **Opuntia nigricans** Haw. Syn. Pl. Succ. (1812) 189.

Subarborescent or shrubby, 3 m. high or more. Leaves 7.5 mm. long, subulate, recurved, reddish at the tips. Joints variable in size, about 18-30 by 10-18 cm., obovate or elliptic, rather thin, not undulate, dull bluish green. Areoles bearing about 4-5 increasing up to 10, rather slender straight prickles which are grey and opaque except when quite young, the largest 3-5 cm. long; glochidia inconspicuous, almost hidden amongst woolly hairs, rusty-brown. Flowers 5 cm. across, yellow or orange. Perianth rotate, the outer segments short, ovate, acute, red in the centre, yellow at the edges, the inner spathulate, acute. Stamens a little shorter than the perianth. Style exceeding the stamens; stigmas 6. Berry pyriform, angular or more or less warty, bearing tufts of glochidia and occasionally a few prickles, reddish purple when ripe.

Distribution: Probably indigenous in Mexico.—Introduced in India.

A good substitute for *O. dillenii.*

Tamil: Nagadali—.

5. **Opuntia dillenii** Haw. Suppl. Pl. Succ. (1819) 79.—Plate 469B.

Shrubby, branched from the base, about 1.5 m. high. Leaves 3.8 mm. long, pale green, conical from a broad base. Joints 30-40 by 15-20 cm., broadly obovate, undulate, not very thick, dull bluish green. Areoles large, bearing 4-6 prickles, the largest very stout, subulate, firm and sharp, 2.5-3.8 cm. long, usually somewhat curved

and of a horny appearance; glochidia numerous about 1.3 cm. long, yellowish. Flowers 7.5 cm. across, yellow tinged with orange. Perianth rotate, the outer segments ovate, acute, rounded, with membranous margins, the inner obovate, rounded, mucronate. Stamens of unequal lengths, scarcely reaching half the length of the inner perianth segments. Style stout, exceeding the stamens; stigmas 5-8, erect. Berry pyriform, truncate, depressed at the apex, often angular or warty when not full ripening, bearing tufts of glochidia, deep reddish purple when ripe.

Distribution: Probably indigenous in Mexico.—Introduced in India.

The plant is bitter, hot; laxative, stomachic, carminative, antipyretic, alexiteric; cures biliousness, burning, leucoderma, "vata", urinary complaints, tumours, ascites, loss of consciousness, piles, inflammations, vesicular calculi, anæmia, ulcers, enlargement of the spleen.—The leaves are very tasty, stomachic; cure inflammations, ascites, tumours, pains.—The flowers cure bronchitis and asthma.—The juice of the plant is heating; alexiteric; cures ascites, tumours, leucoderma, syphilis (Ayurveda).

The plant is bitter, digestive; carminative, diuretic, purgative; cures bronchitis of children; good for leucoderma, enlargement of the spleen; used in ophthalmia, liver complaints, lumbago; cures inflammation.—The juice is used as a cure for earache (Yunani).

The fruit is considered a refrigerant, and is said to be useful in gonorrhœa. In the Deccan, the baked fruit is given in whooping cough (Lisboa).

A syrup of the fruit appears to increase the secretion of bile when given in teaspoonful doses three or four times a day and to control spasmodic cough and expectoration.

In Dacca, the milky juice is given as a purgative in doses of ten drops mixed with a little sugar (Taylor).

The leaves mashed up and applied as a poultice are said to allay heat and inflammation.

The hot leaf applied to boils hastens suppuration; the leaf made into a pulp is applied to the eyes in cases of ophthalmia.

I have used joints warmed up for poultices in guineaworm, abscesses with marked effect (K. R. K.).

The plant enters into the composition of Sushruta's Ksharagada, a snake remedy; but, no part of the plant is an antidote to snake-venom (Mhaskar and Caius).

Arabic: Jhakawoon—; *Bengal:* Nagphana, Phenimama—; *Burma:* Kalazaw, Shasounglitwa—; *Canarese:* Chappatigalli, Dabbugalli, Mullugalli, Nagadali, Papasakalli, Papasukattale, Sivaramakalli—; *Deccan:* Chappal, Chappalsend, Nagphansi—; *English:* Prickly Pear, Slipper Thorn—; *French:* Raquette—; *Gujerati:* Chorhathalo, Zhorhatheylo—; *Hindi:* Haththathoira, Nagphana, Nagphani—; *Malayalam:* Nagamullu, Nagatali, Palakakkalli—; *Marathi:* Chapal, Nagaphana Samar—; *Porebunder:* Hathalo—; *Portuguese:* Palmatoria d'inferno—; *Sanskrit:* Bahudugdhika, Bahushala, Dondavrikshaka, Guda, Gula, Kandarohaka, Kandashakha, Krishnakhara, Kubshadruma, Mahavriksha, Nagadru, Nagaphana, Netrari, Nistrinshapatrika, Samantadugdha, Shakhakanta, Shihunda, Sihunda, Sinhatunda, Snuha, Snuhi, Snuka, Snusha, Sudha, Vajra, Vajradruma, Vajrakantaka, Vajri, Vidara, Visvasaraka—; *Sinhalese:* Kodugaha—; *Tamil:* Kalli, Manjarnagadali, Mullukkalli, Nagadali, Nagakkalli, Palagaikkalli, Pattanadugalli, Sappattu, Sappattukkalli, Sapattumul—; *Telugu:* Nagadali, Nagajemudu, Nagamullu—; *Tulu:* Kalli—; *Urdu:* Nagaphani, Thuar—; *Uriya:* Nagophenia, Nagopheni, Poturiyasiju—.

FICOIDACEAE.

Annual or perennial herbs. Leaves simple, often fleshy, opposite, alternate or falsely whorled; stipules 0 or scarious. Flowers regular, hermaphrodite (rarely polygamous), in cymes or clusters, rarely solitary, never racemose. Calyx 4-5-sepalous or 4-5-partite, free or rarely adnate to the ovary, the lobes usually

green, herbaceous, imbricate, always persistent in fruit. Petals usually wanting; when present, small. Stamens perigynous or hypogynous, definite or indefinite, when equal to the number of sepals usually opposite to them, when more, equidistant or in bundles; filaments subulate or dilated, free or connate into a membranous cup. Disk 0 or annular, often produced into subulate staminodes alternating with the stamens. Ovary usually free, 2-5-celled; ovules solitary in each cell and basal, or many, inserted on placentæ adnate to the interior angle of the cell, amphitropous; styles as many as the cells of the ovary, free, or connate into one split at the apex. Fruit usually capsular, splitting dorsally or circumscissilely, or less commonly separating into cocci, usually smaller than the persistent calyx and included in it. Seeds solitary or numerous, usually reniform, compressed; testa membranous or crustaceous; embryo curved round farinaceous or fleshy albumen.—Genera 20. Species 650.—chiefly S. Africa, but also California, S. America, tropical Africa, Asia and Australia.

A. Stamens inserted on the calyx-tube
    Capsule circumscissilely dehiscent .... TRIANTHEMA.
B. Stamens hypogynous
  1. Fruit capsular
    Petals absent .... MOLLUGO.
  2. Fruit of 1-5, 1-seeded cocci
    Carpels 3-5. Petals absent .... GIESEKIA.

Mild refrigerants of little medicinal interest.

TRIANTHEMA Linn.

Diffuse prostrate branched herbs, glabrous, pubescent or papillose. Leaves petiolate, opposite, unequal, linear, ovate or obovate, quite entire; stipules 0, but the petiole dilated, with membranous stipuliform margins. Flowers axillary, sessile or peduncled, solitary, cymose or panicled. Calyx-tube short or long; lobes 5, coloured within, mucronate at the back. Petals 0. Stamens 5-10 or many, inserted near the top of the calyx-tube. Ovary free, sessile, 1-2-celled, often truncate at the apex; ovules 1-many, basal; styles 1 or 2. Capsule membranous below, with a hard thick cap which is detached

by a circumscissile dehiscence and carries away one or more seeds, 1-2-celled. Seeds 1-many, subreniform; embryo annular.—Species 13.—Tropical and subtropical regions.

A. Stamens 10 or more
  1. Style 1 .... 1. *T. portulacastrum.*
  2. Styles 2 .... 3. *T. decandra.*
B. Stamens less than 10
  Leaves 1.3-3.2 cm. long. Styles 2 .... 2. *T. pentandra.*

Root aperient.

T. portulacastrum Linn. is used medicinally in Indo China and the Philippine Islands.

1. **Trianthema portulacastrum** Linn. Sp. Pl. (1753) 223. —*T. monogyna* Linn. Mantiss. (1767) 69.—Plate 470 (under *T. monogyna* Linn.).

A prostrate somewhat succulent herb; stems more or less angular, glabrous or pubescent, much-branched. Leaves subfleshy, obliquely opposite, unequal, the upper one of the pair the larger, 2-3.8 by 2-3.2 cm., the lower 10-13 by 6-10 mm., broadly obovate, rounded and often apiculate at the apex, cuneate at the base, glabrous; petioles 6-13 mm. long, much dilated and membranous at the base, especially those of the smaller leaves in which the membranous enlargement forms a triangular pouch. Flowers solitary, sessile, almost concealed by the pouch of the petiole. Calyx-lobes ovate, acute. Stamens 10-20. Ovary truncate; style 1. Capsules small, almost concealed in the petiolar pouch, lid truncate, slightly concave, with 2 spreading teeth, carrying away at least one seed, the lower part 3-5-seeded. Seeds reniform, muriculate, dull black.

Distribution: Throughout India, Baluchistan, Ceylon, and most tropical countries.

The plant is bitter, hot; alexiteric, analgesic, stomachic, laxative, alterative; cures "kapha", bronchitis, heart diseases, diseases of the blood, anæmia, inflammations, "vata", piles, ascites.—The root applied to the eye cures corneal ulcers, itching, dimness of sight, night blindness (Ayurveda).

The powdered bitter and nauseous root is given in combination with ginger as a cathartic.

In the Philippine Islands, the powdered root is given as a cathartic.

Bengal: Sabuni—; *Bombay:* Bishkapra, Khapra, Svetapunarnava—; *Canarese:* Muchchugoni—; *Deccan:* Nasurjanghi, Nasurjingh, Vurmah—; *English:* Horse Purslane—; *Hindi:* Salsabuni, Sabuni, Svetsabuni, Vishakhapara—; *Indo China:* Sam—; *Madras:* Mukkarattai—; *Marathi:* Pundharighentuli—; *Nasirabad:* Wisakh—; *Punjab:* Bishkapra—; *Sanskrit:* Chiratika, Dhanapatra, Dirghapatrika, Kathilla, Kathillaka, Prithvi, Punaravi, Shashivatika, Shothaghni, Shvetamula, Shvetapunarnava, Sitavarshabhu, Varshahi, Varshangi, Vishakha, Vrischira—; *Sind:* Narmah—; *Sokoto:* Dabrinsaniya, Hana takama, Gadon machiji—; *Tagalog:* Toston—; *Tamil:* Sharunnai, Shavalai—; *Telugu:* Ambatimadu, Galijeru, Ghelijehru, Yerragalijeru—; *Visayan:* Alusiman, Ayam—.

2. **Trianthema pentandra** Linn. Mantiss. (1767) 70.—PLATE 471.

Diffuse, much-branched, from about 8 cm. to 45 cm. high; stems and branches more or less papillose (sometimes glabrous), angled and grooved. Leaves 1.3-3.2 by 0.6-1.6 cm., elliptic-oblong, sometimes slightly obovate, glabrous or more or less papillose, rounded (rarely subacute) at the apex, narrowed at the base; petioles distinct, 6-13 mm. long, dilated at the base, slightly sheathing. Flowers sessile or subsessile, in few- or many- flowered axillary fascicles; bracteoles thinly membranous. Calyx 2.5-3 mm. long, deeply 5-lobed; lobes ovate-oblong, coloured within, with a short apiculation at the back below the apex. Stamens 5. Styles 2. Capsules 4 mm. long, exserted, the cap with broad deflexed horns, mitriform, dividing into two 1-seeded portions, the lower half of the capsule containing 2 seeds. Seeds 1.5-2 mm. diam., orbicular-reniform, compressed, rugulose, dull black.

Distribution: Punjab, N.-W. Provinces, Sind, W. Rajputana, Konkan, Deccan, S. M. Country.—Tropical Africa.

The plant is used as an astringent in abdominal diseases, and is also stated to produce abortion.

In Las Bela, the plant is used as a cure both for pain in the bladder and for snake-bite (Hughes-Buller).

Kulanch: Indarkah—; *Las Bela:* Lular, Wahu—; *Punjab:* Bishkapra, Itsit, Narwa—; *Sind:* Bishkapra, Fasarlani, Narwa—; *Sokoto:* Dabrin saniya, Hana takama, Gadon machiji—.

3. **Trianthema decandra** Linn. Mantiss. (1767) 70; Wight Ic. t. 296.—PLATE 472.

Stems elongate, prostrate, not much-branched, angular and striate, glabrous. Leaves subfleshy, 2-3.8 by 0.6-1.6 cm., the opposite pairs somewhat unequal, elliptic-oblong, rounded and usually apiculate at the apex; petioles 6-13 mm. long, puberulous, much dilated and amplexicaul at the base, but not enclosing the flowers. Flowers in dense axillary subumbellate clusters; peduncles and pedicels very short; bracteoles thinly membranous. Calyx 4 mm. long; tube very short; lobes much longer than the tube, oblong, obtuse, with scarious margins and with a distinct long apiculation at the back below the apex. Stamens 10. Styles 2. Capsules not enclosed in the tube of the calyx, 4-seeded, the cap very truncate, 3 mm. long, solid, subcylindric with a narrow acute rim round its base, carrying away 2 seeds. Seeds orbicular-reniform, striate, black.

Distribution: S. M. Country, Deccan, Carnatic, on dry-soil lands, a roadside weed.

The root is aperient, and said to be useful in hepatitis, asthma and suppression of the menses. A decoction of the root-bark is given as an aperient.

The root, ground up with milk and given internally, is said to be a specific in orchitis. The juice of the leaves dropped into the nostrils relieves one-sided headache.

Bengal: Gadabani—; *Canarese:* Gaijasoppu—; *Ceylon:* Charanai—; *Deccan:* Bhiskupra—; *Hindi:* Gadabani—; *Madras:* Vellaisaruvelai—; *Sanskrit:* Punarnavi—; *Sinhalese:* Mahasarana—; *Tamil:* Vellaisharunnai—; *Telugu:* Galijeru, Tellagalijeru—.

MOLLUGO Linn.

Erect or diffuse glabrous pubescent or stellately tomentose herbs, often dichotomously branched. Leaves often falsely whorled or alternate, or all radical, linear, obovate or spathulate; stipules membranous, fugacious. Flowers axillary, solitary, fascicled or in diffuse or umbelliform cymes, usually greenish. Sepals 5, subequal, persistent, with membranous margins. Petals 0. Stamens 3-5, subhypogynous, usually alternate with the sepals sometimes intermixed with subulate staminodes. Ovary free, 3-5-celled; ovules many, attached to the interior angle of the cells; styles 3-5. Capsule membranous, included in the calyx, oblong, globose or subcylindric, 3-5-celled, loculicidally 3-5-valved. Seeds several (rarely 1) in each cell, reniform, appendaged at the hilum or not; embryo more or less curved. —Species 15.—Tropics and N. America.

A. Flowers in axillary fascicles. Seeds appendaged
- 1. Densely stellately hairy .... 1. *M. hirta.*
- 2. Glabrous .... 2. *M. oppositifolia.*
- 3. Seeds glabrous with a microscopic scale appendaged to the hilum .... 5. *M. nudicaulis.*

B. Flowers in terminal cymes. Seeds not appendaged
- 1. Seeds with raised tubercular points .... 3. *M. pentaphylla.*
- 2. Seeds without raised tubercular points .... 4. *M. cerviana.*

M. nudicaulis Lam. is used medicinally in Madagascar.

1. **Mollugo hirta** Thunb. Prodr. Pl. Cap. (1794) 24.—*Pharnaceum pentagonum* Roxb. Fl. Ind. II (1832) 103.—PLATE 473A.

Annual, softly villous with (chiefly) stellate hairs; stems many, usually prostrate and spreading 15-45 cm. from a centre, sometimes ascending, leafy. Leaves opposite or several at a node, 1-2 by 0.8-1.3 cm., densely stellately villous on both sides, broadly obovate or suborbicular, very obtuse at the apex, cuneate at the base; petioles 6-10 mm. long, slender, stellately hairy. Flowers pinkish white, in axillary fascicles, 1-6 together; pedicels unequal, 2-4 mm. long, divaricate. Calyx stellately hairy outside; sepals 6-8 mm. long, elliptic-lanceolate, acute. Stamens usually 10 or more, varying to 5. Ovary ovoid, quite glabrous, 5-lobed, 5-celled; ovules many;

styles almost 0 or very short; stigmas usually 5, spreading. Capsules a little shorter than the sepals, ovoid. Seeds many, subreniform, with raised tubercular points, black, appendaged with a white scale at the hilum extended into a long filiform process which curves round the seed.

Distribution: Throughout India, Ceylon.—Warmer regions of the world.

In Pudukotta, the juice is administered internally to weak children.

The dried plant is prescribed for diarrhœa in Sind; and in the Punjab, it is given as a purgative in diseases of the abdomen.

In Las Bela, the plant is a cure for boils and for bilious attacks; also a cure for wounds and pains in the limbs (Hughes-Buller).

Bengal: Duserasag—; *Gujerati:* Gholo okharod—; *Hindi:* Gandibudi—; *Las Bela:* Katok—; *Marathi:* Kotak—; *Porebunder:* Mithookharad—; *Punjab:* Gandibuti, Porprang—; *Sanskrit:* Bhissata, Okharadi—; *Sind:* Kottruk—; *Tagalog:* Lobio—.

2. **Mollugo oppositifolia** Linn. Sp. Pl. (1753) 89.—*M. spergula* Linn. Syst. ed. 10 (1759) 881.—PLATE 474 (under *M. spergula* Linn.).

Diffuse, prostrate or ascending; stems numerous, dichotomously branched, with long internodes, slender, glabrous or pubescent near the ends. Leaves 13-22 by 3-6 mm., in whorls of 4-5, unequal, oblanceolate or linear-lanceolate or sometimes spathulate, rounded or acute and apiculate at the apex, much tapered into the petiole which is therefore obscure. Flowers white, in axillary fascicles of 2 or more; pedicels 6-13 mm. long, filiform. Calyx glabrous outside; sepals 4 mm. long, oblong, subacute, with membranous margins. Staminodes 0. Stamens usually 3. Ovary glabrous; styles 3, very short; stigmas spreading. Capsules ellipsoid, a little shorter than the sepals, 3-celled. Seeds very numerous, subreniform, with raised tubercular points, dark brown, appendaged with a very small white scale at the hilum extended into a bristle which curves round the seed.

Distribution: Gujarat, Deccan, S. M. Country, N. Kanara, Carnatic, in dry places and on waste lands, Ceylon, Burma.—Tropical Africa, Australia.

Considered stomachic, aperient and antiseptic. Ainslie writes that the plant is administered for suppression of the lochia, and when applied warm and moistened with a little castor oil, is reckoned a good application for earache.

In Pudukkota, the juice is applied to itch and other skin diseases.

Bengal: Jima—; *Canarese:* Parpataka—; *Hindi:* Jima—; *Malayalam:* Kaipajira—; *Marathi:* Jharasi—; *Sanskrit:* Phanija—; *Tagalog:* Sarsalida—; *Sinhalese:* Hinpala—; *Tamil:* Kachantarai—; *Telugu:* Chayuntarashiaku—.

3. **Mollugo pentaphylla** Linn. Sp. Pl. (1753) 89.—*M. stricta* Linn. Sp. Pl. ed. 2 (1762) 131.—PLATE 473B (under *M. stricta* Linn.).

Annual, diffuse, glabrous, 15-30 cm. high; stems numerous, with many more or less quadrangular leafy dichotomously arranged branches. Leaves 1.3-3.8 cm. by 3-6 mm., in whorls of 2-9, linear-lanceolate to obovate, obtuse or acute, sometimes apiculate, much narrowed at the base; petioles obscure. Flowers white, numerous, in lax corymbose terminal cymes; peduncles and pedicels filiform; bracts lanceolate, scarious. Calyx glabrous; sepals 1.5-2.5 mm. long, broadly elliptic-oblong, obtuse, parallel-nerved. Stamens usually 3. Styles 3, short, linear. Capsules subglobose, as long as or slightly longer than the sepals, with thin walls. Seeds numerous, roundish reniform, compressed, covered with raised tubercular points, dark brown.

Distribution: Throughout India, Ceylon, Malacca.—China, Japan, Fiji.

Highly esteemed by the Hindus as a bitter vegetable which they eat occasionally on account of its stomachic, aperient and antiseptic properties. An infusion of the plant is given to women to promote the menstrual discharge.

The bitter leaves are antiperiodic.

Bengal: Julpapra—; *Bombay:* Jharas—; *Malay:* Rumput belangkas, Tapak burong—; *Marathi:* Jharasa—; *Tagalog:* Malagoso, Molugoso—; *Telugu:* Verrichatarasi—; *Uriya:* Pitagohum—; *Visayan:* Malugoso, Salsalida—.

4. **Mollugo cerviana** Seringe in DC. Prodr. I (1824) 392.—PLATE 473C.

An annular erect slender glabrous herb 7.5-20 cm. high. Stems very many, almost filiform; branches umbellate, the nodes thickened. Radical leaves 6-13 mm. long, rosulate, spathulate or linear-spathulate. Cauline leaves 6-20 by about 0.8 mm., narrow-linear, apiculate, 2-8 in a whorl; petioles obscure. Flowers numerous, on long filiform stiff pedicels subumbellately arranged, usually in threes on the top of long filiform axillary and terminal peduncles. Sepals 2.5 mm. long, elliptic-oblong, obtuse, with white membranous margins. Stamens 3-5. Styles 3, very short. Capsules subglobose, equalling the sepals. Seeds numerous, smooth, without tubercular points, yellowish brown.

Distribution: Punjab, Sind, W. Rajputana, Gujarat, S. M. Country, Deccan, Carnatic, Ceylon.—Tropical Africa, Australia.

Thwaites states that the plant is used as a medicine in fevers. Dr. Peters in a special note informs us that it has the reputation of promoting the flow of the lochial discharge.

The plant is a cure for gonorrhœa in Las Bela (Hughes-Buller).

Bengal: Ghimasak—; *Las Bela:* Hazardani—; *Marathi:* Pada—; *Sinhalese:* Patpadagau—; *Tamil:* Parpadagam—; *Telugu:* Parpataka—.

5. **Mollugo nudicaulis** Lam. Encycl. IV (1796) 234.

Annual, slender. Leaves all radical, crowded, about 3.8 cm., oblong-spathulate, rounded at apex, much tapering into ill-defined petiole, glabrous, entire. Flowering-stems several, erect, 10-15 cm. slender, glabrous, leafless, trichotomously branched above; flowers on stiff, glabrous pedicels, arranged in lax trichotomous cymes; sepals oval, very obtuse, with membranous margins, capsule nearly globose. Seeds minute, reticulate, dull black.

Distribution: Hotter parts of India, Ceylon.—Tropical Africa, New Caledonia, Cuba.

In Lakhimpur (Assam) the leaves are applied to boils to draw out the pus (Carter).

In Madagascar, the bitter plant is considered pectoral, and is used in athrepy and whooping cough.

Madagascar: Aferontany—; *Madras:* Parppadagam—.

Giesekia Linn.

Diffuse branched usually annual herbs. Leaves opposite or falsely whorled, subfleshy, linear or spathulate, abounding in raphides; stipules 0. Flowers small, in lax or dense axillary sessile fascicles or shortly peduncled umbellate cymes, hermaphrodite or polygamous. Sepals 5, equal, herbaceous or with membranous margins. Petals 0. Stamens 5-15, hypogynous; filaments dilated at the base; anthers oblong. Carpels usually 5, distinct, sessile on a small torus, 1-celled; ovules solitary, basal; styles as many as the carpels. Fruit of 5 free membranous compressed papillose indehiscent 1-seeded carpels. Seeds vertical, compressed, subreniform; embryo annular.—Species 5.—Arabia, India.

The genus is therapeutically inert.

1. **Giesekia pharnacoides** Linn. Mantiss. (1771) 562.—Plate 475.

A diffuse somewhat succulent glabrous herb; stems 15-45 cm. long; branches prostrate or ascending. Leaves subfleshy, subopposite, 2-3.8 cm. by 3-6 mm., linear-oblong, elliptic-lanceolate or spathulate-oblong, obtuse or subacute, entire, tapering at the base, glabrous, glaucous; petioles 0-6 mm. long. Flowers numerous, in almost sessile umbellate cymes; pedicels slender, 2.5-4 mm. long, Sepals 2-2.5 mm. long, elliptic-oblong, obtuse, with membranous margins. Stamens 5; filaments dilated at the base. Ripe carpels membranous, as long as the sepals and surrounded by them. Seed solitary, rounded on the back, black, with scattered white glandular prominences.

Distribution: Punjab, Baluchistan, Rajputana Desert, Sind, Gujarat, Konkan, S. M. Country, Deccan and Carnatic of Madras Pres., Ceylon.—Afghanistan, Africa.

The plant is acrid, pungent; digestible, alexiteric, anthelmintic, vulnerary; cures scabies, thirst, rhinitis, bronchitis, loss of appetite, heart troubles, leprosy, leucoderma, urinary diseases (Ayurveda).

The plant has been found to act as a powerful anthelmintic in cases of tænia. The discoverer, Capt. W. H. Lowther (Journ. Agri-Hort. Soc. of India, 1857), directs that the fresh plant, including the leaves, stalks and capsules, be administered in doses of about an ounce ground into a powder and given in the form of a draught with water. The dose is recommended to be repeated three times, at intervals of four days.

French: Gisĕque—; *Hausa:* Dandami—; *Madras:* Panekirai—; *Sakalave:* Kimenamena—; *Sanskrit:* Aileya, Aluka, Elavaluka, Elvalu, Gandhatvaka, Harivaluka, Kapitha, Kapithatvaka, Kushtagandhi, Sugandhi, Valu, Valuka—; *Sinhalese:* Etrillapalla—; *Sokoto:* Lallen shamuwa—; *Tamil:* Manalikkirai—; *Telugu:* Isakadasarikura, Isikedantikura—.

UMBELLIFERAE.

Herbs (rarely shrubs or trees). Leaves usually alternate, simple or compound, exstipulate (except HYDROCOTYLE); petiole generally sheathing at the base. Flowers usually bisexual, often slightly irregular, in simple or compound umbels, rarely in heads or whorls; umbels and umbellules each furnished with an involucre of bracts or one or both naked. Calyx-tube adnate to the ovary; teeth 5 or 0 (so that there seems to be no calyx). Petals 5, epigynous, distinct, sometimes unequal, often bifid, with an inflexed apex and an impressed midrib, imbricate in bud (sometimes valvate in HYDROCOTYLE. Stamens 5, epigynous, alternating with the petals. Ovary inferior, 2-celled, crowned by a large epigynous usually 2-lobed disk; ovule solitary in each cell, pendulous; styles 2, often dilated at the base into stylopods which crown the ovary; stigma minute, capitellate. Fruit of 2 indehiscent dorsally or laterally compressed separable carpels (mericarps), separated by a commissure and attached to and often pendulous from a slender central axis (carpo-

phore). The mericarps are usually marked by 5 longitudinal lines (primary ridges), 1 dorsal, 2 marginal and 2 intermediate, and often with 4 more (secondary ridges) alternating with the primary ones; pericarp often traversed by oil-canals (vittæ). Seed 1 in each carpel, pendulous from the point of the attachment to the carpophore; testa thin; albumen cartilaginous; embryo minute, straight, near the apex of the seed; radicle superior.—Genera 200. Species 2,700. —Cosmopolitan, chiefly N. temperate.

A. Umbels simple or irregularly compound. Vittae absent
- I. Leaves undivided, stipulate. Fruit laterally compressed ..... HYDROCOTYLE.
- II. Leaves spinulose serrate. Flowers capitate .... ERYNGIUM.

B. Umbels compound, secondary ridges of the fruit inconspicuous
- I. Fruit laterally compressed or at least constricted at the commissure, not or very obscurely winged
  Carpels in outline ovate or oblong, not distinctly narrowed upwards, plain on the inner face. Seed plain or concave on the inner face
  1. Leaves entire. Flowers yellow or lurid .... BUPLEURUM.
  2. Umbels short-peduncled, leaf-opposed, ebracteolate ... APIUM.
  3. Ridges of the fruit slender, valleys 1-vittate .... CARUM.
  4. Ridges of the fruit slender, valleys 2-3-vittate ...... PIMPINELLA.
- II. Fruit widest at the commissure in horizontal section circular or somewhat dorsally compressed
  - a. Primary ridges of the fruit more or less distinct, not alate
    1. Fruit subglobose or subcylindric, ridges distinct. Petals white .... SESELI.
    2. Central flower of the umbellule sessile perfect, lateral male pedicelled .... PYCNOCYCLA.
    3. Leaves cut into filiform segments. Bracts absent, Petals yellow .... FOENICULUM.
    4. Fruit 20 mm., roughly corrugated between the ridges .... PRANGOS.
  - b. Primary ridges of the fruit (or the lateral only) more or less excurrent, winged
    Leaves compound, pinnate with large segments. Fruit 13 mm. .... ANGELICA.
- III. Fruit much dorsally compressed, dorsal ridges slightly excurrent, lateral winged, wings of the opposite carpels closely applied face to face
  1. Petioles of the leaflets winged. Petals yellow. Fruit 13 mm. .... FERULA.
  2. Flowers not radiant. Ovary glabrous .... PEUCEDANUM.
  3. Ovary pubescent. Vittae rarely reaching the base of the fruit .... HERACLEUM.
  4. Wings of carpels hyaline with a very thick border ... ZOSIMIA.

C. Umbels compound. Secondary ridges of the fruit prominent, primary equally or less prominent or inconspicuous
- I. Fruit glabrous
  - a. Fruit globose. Bracts absent .... CORIANDRUM.
  - b. Fruit narrowly oblong. Bracts slender, simple .... CUMINUM.
- II. Fruit hirsute or setose
  - a. Bracts pinnate. Seed plain on the inner face .... DAUCUS.
  - b. Bracts linear-lanceolate membranous .... PSAMMOGETON.

The Order includes medicinal and kitchen herbs as well as dangerous and poisonous plants. In general the aromatic members are tonic, stimulant, and carminative; the non-aromatic members are acrid and narcotic poisons.

The following are among the substances which have been isolated:—(1) hydrocarbons—cymene, dipentene, d-limonene, phellandrene, pinene, terpinene—; (2) alcohols—angelicol, borneol, geraniol, inositol, d-linalool, manitol, terpineol—; (3) phenols and phenolic ethers—anethol, apiol, methylchavicol, quinol, safrol, thymol—; (4) aldehydes—acetic, anisic, cuminic—; (5) ketones—anise ketone, carvone, fenchone—; (6) acids—angelic, benzoic, malic—; (7) glucosides—apiin—; (8) alkaloids—conhydrine, γ-conhydrine, γ-coniceine, coniine, daucine, N. methylconiine—; (9) gum resins—asafetida, galbanum opoponax, sagapenum—.

Coriander, cumin, dill, and fennel have been distilled and the analytical constants of their oils determined by Sanjivarao, Sudborough, and Watson (*Journ. Ind. Inst. Sc.;* VIII, 1925).

OFFICIAL:—Anethol (Austria, Belgium); apiol (Belgium, France, Spain); thymol (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Anethum foeniculum Linn.=*Foeniculum vulgare* Gaertn., *F. officinale* Allioni (Portugal); *A. graveolens* Linn. (Great Britain) =*Pastinaca Anethum* Spreng. (Portugal); *A. segetum* Linn. (Portugal).

Angelica archangelica Linn. (Belgium, France, Switzerland)=*Archangelica officinalis* Hoffm. & Koch (Hungary, Portugal).

Apium graveolens Linn. (France), var. *lusitanicum* De Cand. =*A. lusitanicum* Mill. (Portugal); *A. Petroselinum* Linn.= *Petroselinum* sativum Hoffm. & Koch (Portugal).

Archangelica officinalis Hoffmann (Austria, Germany, Turkey).

Carum carvi Linn. (Austria, Germany, Great Britain, Norway, Sweden, Switzerland, United States)= *Seseli carvi* Scop. (Portugal); *C. Petroselinum* Bentham & Hooker (Austria).

Conium maculatum Linn. (Austria, France)=*Cicuta maculata* Lamk. (Portugal).

Coriandrum sativum Linn. (Austria, Belgium, Denmark, France, Great Britain, Holland, Hungary, Norway, Portugal, Spain, Turkey, United States).

Cuminum cyminum Linn. (Portugal).

Daucus Carota Linn. var. *sativa* De Cand. (Portugal).

Doresma spp. (Germany, Sweden); *D. ammoniacum* Don. (Belgium, Denmark, France, Germany, Holland, Italy, Japan, Norway, Spain, Sweden, Switzerland)=*Heracleum gummiferum* Willd. (Portugal); *D. Anckeri* Boiss. (Spain); *D. Aucheri* Boiss. (Holland); *D. aureum* Stocks (Holland); *Dorema Ammoniacum* Don (Austria).

Ferula spp. (Austria, Belgium, Denmark, Germany, Great Britain, Japan, Norway, Spain, Sweden, Switzerland, United States); *F. alliacea* Boissier (Spain); *F. asafoetida* Linn. (Italy, United States); *F. Asa foetida* Linn. (Denmark, France, Japan, Norway, Russia)=*Scorodosma foetidum* Bunge (Portugal, Spain); *F. Assafoetida* Linn. (Belgium, Germany, Holland)=*F. foetida* Regel, *F. Scorodosma* Bentley & Trimen (Switzerland); *F. erubescens* O. Berg. =*F. rubricaulis* Boissier (Portugal); *F. foetida* Regel (Belgium, Great Britain, Holland, Japan, United States),—(Bunge) Regel (Germany, Russia); *F. galbaniflua* Boissier (Norway),—Boiss. & Bushe (France),—Boiss. & Buhse (Austria, Belgium, Denmark, Germany, Holland, Japan, Portugal, Russia, Spain, Switzerland); *F. Narthex* Boiss. (Austria, Belgium, France, Germany, Japan, Norway, Russia)=*Narthex asa foetida* Falconer (Portugal)=*N. Assafoetida* Falconer (Spain); *F. rubricaulis* Boissier (Austria, Great Britain, Norway, Spain); *F. scorodosma* Bentham & Hooker (Austria).

Foeniculum capillaceum Gilib. (Belgium, Denmark, Sweden); *F. dulce* DC. (France, Italy); *F. vulgare* Gaertner (Austria),—Mill.

(Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Switzerland, Turkey, United States)=*F. officinale* All. (Italy).

Hydrocotyle asiatica Linn. (Holland).

Laserpitium Chironium Linn. (Portugal).

Levisticum officinale Koch (Germany, Switzerland).

Pastinaca opopanax Linn. (Portugal).

Petroselinum sativum Hoff. (Denmark, France, Norway, Switzerland).

Phellandrium aquaticum Linn.=*Oenanthe Phellandrium* Lamk. (Portugal).

Pimpinella Anisum Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*Anisum vulgare* Gaert. (Hungary)=*Sison Anisum* Spreng. (Portugal); *P. magna* Linn. (Germany, Switzerland); *P. saxifraga* Linn. (Germany, Norway, Switzerland).

Scandix cerefolium Linn.=*Choerophyllum sativum* Lamk. and Brot. (Portugal).

Sumbulus moschatus Koch=*Euryangium Sumbul* Kauffmann (Portugal).

Thapsia garganica Linn. (France, Portugal).

Trachyspermum Ammi (Linn.) Sprague (Great Britain).

HYDROCOTYLE Linn.

Annual or perennial herbs growing in moist places, usually prostrate and creeping and rooting at the nodes. Leaves orbicular or reniform; stipules small, scarious, sometimes lacerate. Flowers (in the Indian species) in very small heads or simple umbels, white or purplish, sometimes unisexual. Involucre-bracts few or 0. Calyx-teeth minute or obsolete. Petals entire, valvate or imbricate. Fruit somewhat fleshy, laterally compressed; commissure narrow; mericarps with the primary and sometimes the secondary ridges visible; vittae 0. Carpophore 0. Seed laterally compressed.—Species 75.—Tropical and temperate.

1. Petals obtuse, imbricate. Secondary ridges as distinct as the primary. Pericarp much thickened .... 1. *H. asiatica.*
2. Petals acute, valvate. Secondary ridges absent. Pericarp not thickened .... 2. *H. javanica.*

The genus has stimulant and tonic, diuretic and aperient, and emetic properties.

The following species are used medicinally in China—*H. rotundifolia* Roxb.—; in Indo China—*H. asiatica* Linn., *H. rotundifolia* Roxb.—; in the Philippine Islands—*H. asiatica* Linn.—; in Ceylon and the Malay Archipelago—*H. javanica* Thunb.—; in Brazil —*H. umbellata* Linn.—; in La Reunion—*H. asiatica* Linn.—; in Madagascar—*H. superposita* Bak., *H. tussilaginifolia* Bak., *H. umbellata* Linn.—; in South Africa—*H. bonariensis* Lam.—.

OFFICIAL:—The leaves of *H. asiatica* (Holland).

1. **Hydrocotyle asiatica** Linn. Sp. Pl. (1753) 234; Wight Ic. t. 565.—PLATE 476.

A slender herbaceous creeping plant; stems long, prostrate coming off from the leaf-axils of a vertical rootstock, filiform, often reddish, and with long internodes, rooting at the nodes. Leaves 1.3-6.3 cm. diam., several from the rootstock which often have much elongated petioles, and 1-3 from each node of the stems, orbicular reniform, rather broader than long, more or less cupped, entire or shallowly crenate, glabrous on both sides, and with numerous slender nerves from a deeply cordate base; petioles very variable in length 7.5-15 cm. long or more, channelled, glabrous or nearly so; stipule short, adnate to the petioles forming a sheathing base. Flowers in fascicled umbels, each umbel consisting of 3-4 pink, sessile (rarely pedicelled) flowers; peduncles pubescent or glabrous, short, pink; bracts ovate, acute, concave, 2 beneath each umbel. Calyx-teeth 0. Petals minute, pink, ovate, acute. Fruit 4 mm. long, longer than broad, ovoid, hard, with thickened pericarp, reticulate-rugose, often crowned by the persistent petals, the primary and secondary ridges distinct.

Distribution: Throughout India, Ceylon.—Tropical and subtropical regions of the world.

The plant is acrid, bitter, sweetish; digestible, laxative, cooling, tonic, alterative, alexiteric, antipyretic; improves appetite, voice, memory; cures leucoderma, anæmia, urinary discharges, diseases of the blood, bronchitis, inflammations, fevers, " kapha ", biliousness, enlargement of the spleen, thirst, asthma, smallpox; used in insanity (Ayurveda).

The plant has a bitter, bad taste; soporific, sedative to the nerves, tonic, cardiotonic, bechic, stomachic, carminative, diuretic; clears the voice and the brain; cures hiccough, asthma, bronchitis, scalding of urine, headache; improves appetite (Yunani).

The plant is considered a useful alterative and tonic in diseases of the skin, nerves, and blood. In some parts of India, the people are in the habit of taking the powdered dried leaves with milk for improving their memory, and as an alterative tonic.

The leaves are said to be useful in syphilitic skin diseases, both externally and internally; and on the Malabar Coast, the plant is one of the remedies for leprosy. Dr. A. Hunter, after trying it in the Madras Leper Hospital, came to the conclusion that it had no claim to consideration as a specific in leprosy, but found it most useful in ameliorating the symptoms and improving the general health.

In Bombay, it is a popular remedy for the slight dysenteric derangements of the bowels to which children are subject; three or four leaves are given with cumin and sugar, and the pounded leaves are applied to the navel. In the Konkan, one or two leaves are given every morning to cure stuttering; and the juice is applied (generally as a *lep* with Cadamba bark, ghi, and black cumin) to skin eruptions supposed to arise from heat of blood.

In Java, according to Horsfield, the leaves are considered diuretic.

In Ceylon, the leaves are taken as a tonic and blood purifier; also for indigestion, nervousness, and dysentery.

In Indo China, the plant is considered diuretic. It is used internally as an alterative tonic, and externally as a stimulant.

The entire plant is used by vaidyans in derangement of the three humours. The leaves are used as diuretic and are said to be beneficial in skin diseases, especially in leprosy. For leprosy it is

given in the form of powder, decoction, or syrup. A syrup of the leaves was administered in two cases of chronic psoriasis. There was some inprovement noticed in the patches after its administration for a few days (Koman).

The plant, in combination with other drugs, is recommended for snake-bite (Rasaratnakara); but, no part of it is an antidote to snake-venom (Mhaskar and Caius).

Annam: Cay ma, Co rau ma, Dia tien, Dia tien thao, Doc cuoc the, Ho tuy, Lien tien thao, Ma dat, Ma thieng, Rau ma, Rau ma mo—; *Arabic:* Artaniyaehindi, Jharniba—; *Assam:* Manimuni—; *Bengal:* Brahmamanduki, Tholkuri—; *Bombay:* Karinga, Karivana—; *Burma:* Minkuabin—; *Cambodia:* Trachiek kranh—; *Canarese:* Vondelaga—; *Dacca:* Bhikapurni—; *Deccan:* Vallari—; *Dutch Indies:* Antanan, Kakikoeda, Pegagan—; *English:* Indian Pennywort, Thick-leaved Pennywort—; *French:* Bevilaque, Cotyliole asiatique, Hydrocote d'Asie—; *German:* Wassernabel—; *Gujarat:* Barmi—; *Hindi:* Brahmamanduki, Khulakhudi—; *Hova:* Loviantsahonantanenty, Raivolesoka, Viliantsahonantanenty—; *Indo China:* Ban dai uyeh, Rau ma, Tich huyet thao—; *Kwang Tung:* Loui Kong Ken—; *La Reunion:* Cochlearia du pays—; *Malay:* Pegaga—; *Malayalam:* Kodagam, Kutakam, Muthal—; *Marathi:* Brahmi—; *Mundari:* Cokeara—; *New Caledonia:* Volari—; *Persian:* Sardeturkastan—; *Philippines:* Rabasa—; *Sanskrit:* Bhekaparni, Bheki, Brahmamanduki, Darduchhada, Divya, Mahaushadhi, Mandukaparni, Mandukaparnika, Manduki, Supriya, Tvashti—; *Sinhalese:* Hingotukola—; *Tagalog:* Taguipcuhol, Taguipsoso, Taquipcohol, Taquipsuso—; *Tamil:* Babassa, Vallarai, Vallari—; *Telugu:* Babassa, Bekaparnamu, Bokkudu—; *Urdu:* Barhmi—; *Visayan:* Yahonyahon—.

2. **Hydrocotyle javanica** Thunb. Dissert. II, 415, t. 3.—*H. polycephala* Wight & Arn. Prod. 366; Wight Ic. t. 1003.

Stem creeping and throwing up branches 30 cm. tall. Leaves rounded or reniform cordate with 5 or 6 lobes more or less crenulate, 5 cm. wide and a little shorter; petioles 2.5-10 cm. long, pubescent. Peduncles numerous terminal, hairy, 13 mm. long with

numerous bracts at the base, each bearing a compact umbel or head of many small white flowers, occasionally branched. Fruit numerous, crowded, broadly obovoid, compressed, 2.5 mm. long.

Distribution: Himalaya from Kashmir to Bhutan 2,000—8,000 ft., Khasia Mts. 2,000—6,000 ft., Mountains of Malabar and Ceylon; Burma, Malaya to Australia.

It is used as a substitute for *H. asiatica* in Ceylon and the Malay Archipelago. The leaves are taken as tonic and blood purifier; also for indigestion, nervousness, and dysentery.

Sinhalese: Mahagotukola—.

ERYNGIUM (Tourn.) Linn.

Spinescent, glabrous, erect, perennial herbs (the Indian species). Leaves spinous-toothed, entire lobed or dissected. Flowers in simple heads, each bracteolate; bracts stellate, spinulose (in Indian species). Calyx-tube covered with ascending hyaline scales; teeth rigid, acute. Petals white, narrow, erect, emarginate, scarcely imbricate. Fruit ellipsoid, nearly cylindric; carpels dorsally subcompressed, subconcave on the inner face; primary ridges obtuse not prominent, secondary 0; vittae in the primary ridges inconspicuous or 0, with some very slender scattered in the endocarp; carpophore 0. Seed semiterete, dorsally subcompressed, subconcave on the inner face.—Species 220.—Tropical and temperate regions (excluding S. Africa).

The root often exhibits tonic, expectorant, diuretic, and diaphoretic properties.

The following species are used medicinally in Europe—*E. alpinum* Linn., *E. amethystinum* Linn., *E. campestre* Linn., *E. maritimum* Linn., *E. planum* Linn.—; in Indo China—*E. foetidum* Linn.—; in North America—*E. yuccaefolium* Michx.—; in Mexico, Nicaragua, and Guiana—*E. foetidum* Linn.—; in Brazil—*E. foetidum* Linn., *E. pristis* Cham. & Schl., *E. yuccaefolium* Michx.—; in Chili—*E. arvense* Phil., *E. rostratum* Cav.—.

1. **Eryngium coeruleum** Bieb. Fl. Taur. Cauc. I, 200 (excl. syn.).—PLATE 477A.

Stem 0.6-0.9 m. high, undivided below, often bluish above.

Basal leaves 12.5 by 4.5 cm., long-stalked, cordate-oblong, undivided, crenate, not spiny, stalk 5-15 cm. long; upper stem-leaves stalkless, palmately divided into lance-shaped slightly spinous segments. Bracts 5-6, 2.5 cm. long, linear, with a few spines on the margin. Bracteoles linear, slightly spiny, simple, reaching beyond the flowers, a few sometimes spinous. Calyx-tube densely scaly; teeth lance-awl-shaped, spiny. Fruit 3 mm. long.

Distribution: Kashmir, 5,000—6,000 ft.—Afghanistan, Persia, Turkestan.

The root is sweet; sticky; aphrodisiac, tonic, hæmatinic; useful in paralysis.—The seeds are tonic and stimulant (Yunani).

The root is considered a nervine tonic and aphrodisiac. The seeds are said to be used medicinally in Kandahar.

The ashes of the plant are recommended for hæmorrhoids (Honigberger).

Arabic: Husiektalib, Shakakulmisri—; *Hindi:* Dhudhali—; *Persian:* Gursdusti—; *Punjab:* Kandu, Mittua, Nuralam, Paharigajar, Poli—; *Urdu:* Salelimisri—.

Bupleurum (Tourn.) Linn.

Glabrous annual or perennial herbs or shrubs. Leaves quite entire, the lowest grass-like. Flowers in compound umbels, usually with involucres and involucels, small, yellow or lurid. Calyx-teeth 0. Petals broad, emarginate, inflexed. Disk broad, flat. Styles short. Fruit more or less laterally compressed, slightly constricted at a somewhat broad commissure; mericarps subpentagonal; primary ridges distinct, with 1-3 vittae between them; secondary ridges 0 or obscure. Carpophore 2-fid or 2-partite. Seeds subterete, sometimes grooved on the face.—Species 100.—Europe, Asia, Africa, N. America.

1. Bracts 1-5, lanceolate, small or absent .... 1. *B. falcatum.*
2. Bract 1, ovate, foliaceous, often amplexicaul or cordate, occasionally absent .... 2. *B. jucundum.*

The root is stimulant and diaphoretic; it is said to be effective in thoracic and abdominal inflammation and fever, and useful in flatulence and indigestion.

The following are used medicinally in Europe—*B. falcatum* Linn., *B. rotundifolium* Linn.—; in China—*B. falcatum* Linn., *B. longeradiatum* Turcz., *B. octoradiatum* Bunge—; in Indo China—*B. falcatum* Linn., *B. jucundum* Kurz., *B. octoradiatum* Bunge—; in Malaya—*B. falcatum* Linn.—.

1. **Bupleurum falcatum** Linn. Sp. Pl. (1753) 237.—PLATE 478 (right hand figure).

Stems up to 1.2 m. high, bluish green. Leaves stalkless, linear, 10-25 cm. by 6-8 mm. long, usually curved like a scythe, nerves 5-7, prominent, margins thick. Bracts 1-5, linear-lance-shaped, sharp-pointed, up to 6 mm. long. Bracteoles 4-5, lanceolate, shorter than their umbels. Umbels compound: rays about 3-15; flower-stalks 5-15, usually less than half the length of the fruit. Fruit very variable as to shape and size, 5-4 mm. long, brown, ridges distinct, furrows 1-6-vittate, commissures 1-10-vittate.

Distribution: Himalaya from Kashmir to Bhutan 3,000—12,000 ft.—Temperate E. Asia to Japan, W. and Central Asia, S. and Central Europe.

In Indo China, the roots, in combination with other drugs, are prescribed in liver troubles and as a diaphoretic.

The root causes perspiration; it is said in China, to be effective in thoracic and abdominal inflammation and fever, and useful in flatulence and indigestion. It is used in malaria and various other fevers.

" We are compelled to conclude that " Saiko " is not so effective upon the malarial infections as they have thought, or to say without reserve, it has no curative effect upon this malady " (*Journ. Med. Ass. Formosa;* January, 1931).

Canton: Ngan ch'ai oo—; *Chinese:* Ch'ai Hu—; *English:* Sickle Hare's Ear—; *French:* Buplĕvre, Herbe vulnéraire—; *Indo China:* Bac sai ho—; *Malaya:* Ch'ai hu, Chai foo, Yin ch'ai hu, Yin ch'airvvo—; *Punjab:* Kalizewar, Sipil—.

2. **Bupleurum jucundum** Kurz in Seem. Journ. Bot. (1867) 240.

Stems 30-60 cm. high, erect, but decumbent at the base. Lower

stem-leaves 2.5-3.8 cm. long, short-stalked, round, stalk scarcely 3 mm. long; upper stem-leaves 2.5-5 cm., round or ovate-oblong, deeply cordate, stem clasping. Bract 1, 620 mm. long, ovate, leafy, often stem-clasping or cordate, sometimes absent. Bracteoles 4-5, about 4 mm. long, often absent. Umbel compound; rays 5-8, angular. Flower-stalks about half the length of the fruit. Fruit about 6 mm. long, elliptic-oblong, ridges prominent, furrows 3-4 vittate, commissures 4-vittate.

Distribution: Kashmir, Punjab.—Amurland.

The roots are diaphoretic and antipyretic. In Indo China, they are given in diseases of the liver.

Indo China: Nam sai ho—.

APIUM (Tourn.) Linn.

Herbs, annual or perennial, glabrous. Leaves pinnate 3-partite or compound. Umbels compound, often leaf-opposed. Bracts and bracteoles 0 (in Indian species). Flowers white. Calyx-teeth obsolete. Petals ovate, acute, tip inflexed. Fruit orbicular or elliptic, slightly longer than broad, laterally subcompressed; carpels semiterete, subpentagonal, plane on the inner face; primary ridges distinct, filiform; secondary 0; furrows 1-vittate. Seed semiterete.—Species 40.—Cosmopolitan.

A. graveolens Linn. is used medicinally in Europe and China.

OFFICIAL:—The stock and roots of *A. graveolens* Linn. (France); —var. *lusitanicum* De Cand.=*A. lusitanicum* Mill. (Portugal).

The roots and fruits of *A. Petroselinum* Linn.=*Petroselinum sativum* Hoffm. and Koch (Portugal).

1. **Apium graveolens** Linn. Sp. Pl. (1753) 264.—PLATE 478 (left hand figure).

Biennial. Stems 0.3-2.4 m., erect, branching. Radical leaves pinnate, with large deeply lobed segments, cauline 3-partite; segments once or twice trifid, coarsely toothed at the apex. Peduncle 6 mm. or less, leaf-opposed. Umbel-rays 5-10, pedicels 6-16. Fruit 1.5-2 mm.; ridges narrow, vittae broad.

Distribution: Foot of the N.-W. Himalaya and outlying hills in the Punjab.—Afghanistan, W. Asia, Europe, N. Africa, Abyssinia.

The seeds have a pungent, sharp taste; stomachic, aphrodisiac, tonic, astringent to the bowels; improve appetite; cure "kapha" and "vata"; good for the heart; useful in ophthalmia, bronchitis, vomiting, hiccough, rectal troubles, ascites, eructations, abdominal pain, toothache, tumours; cause burning sensation (Ayurveda).

The seeds have a hot, sharp taste; laxative, carminative, appetiser, anthelmintic, aphrodisiac, abortifacient; good in ophthalmia, scabies, scorpion and other stings; cure asthma, vomiting, diseases of the heart and spleen, amenorrhea, urinary discharges, fever with cough, rheumatism, chest pains, inflammations; ustful in catarrh of the nose (Yunani).

The root is considered alterative and diuretic, and given in anasarca and colic.

The seeds also are given as stimulant and cordial.

As an antispasmodic, they are used in bronchitis, asthma, and to some extent for liver and spleen diseases, and said to be emmenagogue.

The seeds are considered carminative, diuretic, and tonic in Europe. The plant is recommended as excellent in rheumatism.

Celery seed and apiol cannot be recommended as anthelmintics (Caius and Mhaskar).

Arabic: Karafs—; *Bengal:* Chanu, Randhuni—; *Bombay:* Ajmud, Bodiajamoda—; *Catalan:* Apit—; *Chinese:* Chin—; *Cutch:* Ajwankaputa, Budiajiwan—; *English:* Celery, Cultivated Celery, Marsh Parsley, Smallage, Wild Celery—; *French:* Ache, Ache cultivée, Ache d'eau, Ache des marais, Ache douce, Ache odorante, Ache puante, Cleri, Céleri des marais, Céleri navet, Céleri rave, Céleri sauvage, Eprault, Persil des marais, Persil odorant—; *German:* Eppich, Sellerie, Sumpfeppich, Wassereppich, Wassermark, Wasserpeterlein, Wildersellerie—; *Greek:* Eleioselinon—; *Gujerati:* Bodiajamoda—; *Hindi:* Ajmud, Boriajmud, Karafs—; *Hova:* Selery—; *Italian:* Appio, Sedano—; *Languedoc:* Api, Api bousguas—; *Malta:* Celery, Sedano, Carfus—; *Marathi:* Ajmoda—; *Persian:* Karasb—; *Portuguese:* Apio, Apio hortense—;

Punjab: Bhutjhata—; *Roumanian:* Telin—; *Russian:* Dikiy selderei, Selderei—; *Sanskrit:* Ajamoda, Andhapatrika, Brahmakoshi, Brahmamusha, Dipyaka, Gandhadala, Hastikavari, Hayagandha, Karavi, Kharashva, Kharavha, Lochamastaka, Markati, Mayura, Moda, Modadhya, Modini, Phalamukhya, Shikkimoda, Ugragandha, Ugragandhika, Vanhidipika, Vastamoda, Vishali—; *Spanish:* Apio, Apio comun—; *Urdu:* Ajmod—.

CARUM Rupp. ex Linn.

Herbs, perennial or annual. Leaves pinnate or decompound. Umbels compound; bracts simple or divided, bracteoles simple. Flowers white (in the Indian species), polygamous, sterile flowers often with enlarged or irregular petals. Calyx-teeth small or 0. Petals retuse or emarginate. Fruit ovoid ellipsoid or oblong, laterally compressed and more or less constricted at the commissure; carpels terete, subpentagonal, plane on inner face, primary ridges slender, conspicuous or obscure, lateral commissural, furrows 1-vittate; carpophore 2-fid or partite.—Species 20.—Temperate and subtropical.

A. Fruit glabrous or very nearly so
   1. Ultimate segments of the lower leaves lanceolate .... 1. *C. carvi.*
   2. Ultimate segments of all the leaves linear .... 2. *C. bulbocastanum.*
B. Fruit hispid or muricate
   1. Ultimate segments of the lower cauline leaves narrowly linear-lanceolate .... 3. *C. roxburghianum.*
   2. Ultimate segments of all the leaves linear .... 4. *C. copticum.*

The root and the fruit are stimulant and carminative.

The following are used medicinally in Europe—*C. carvi* Linn.—; in Persia, Egypt, and the Philippine Islands—*C. copticum* Benth.—; in Indo China—*C. roxburghianum* Benth.—; in South Africa—*C. capense* Sond.—.

OFFICIAL:—The fruit of *C. carvi* Linn. (Austria, Germany, Great Britain, Norway, Sweden, Switzerland, United States)=*Seseli Carvi* Scop. (Portugal).

1. **Carum carvi** Linn. Sp. Pl. (1753) 378.—PLATE 479A.

A biennial forming a tap-root, and perhaps occasionally a

perennial stock. Stem erect, branched 35-60 cm. high. Leaves with a rather long sheathing footstalk, pinnate, with several pairs of segments which are sessile, but once or twice pinnate, with short linear lobes; in a leaf of 6 or 8 cm., the lowest or next to the lowest segments are about 3/4 of a cm. long, the others diminishing gradually to the top. Upper leaves smaller and less divided. Umbels of about 8 or 10 rays, either without involucres, or with 1 or 2 small linear bracts. Carpels (commonly called Caraway seeds) about 5 mm. long, linear-oblong, and usually curved, with the ribs prominent.

Distribution: Kashmir, Garhwal, 9,000—12,000 ft.,—W and N. Asia, Europe; often cultivated.

The seeds are pungent, sharp, hot; astringent to the bowels, antiperiodic, antidysenteric, carminative, anthelmintic; cure inflammations, "kapha", diseases of the head, leucoderma, dysentery, abdominal tumours; good for the eyes; improve the taste (Ayurveda).

The seeds are bitter, hot; cooling to the brain, astringent to the bowels, carminative, stomachic, diuretic, expectorant, pectoral, tonic, anthelmintic; cure hiccough, eructations; allay griping in the abdomen; increase the appetite; strengthen the sight; the burnt powder is applied to piles (Yunani).

A carawy bath is recommended for painful swelling of the womb, and a poultice for painful and protruding piles.

They are much used as a lactagogue.

The fruit is used as a carminative and stimulant all over Europe. In England, it is given in children's ailments, flatulence, and stomachic derangements. In Germany, the seeds are given for hysterical affections and for flatulent colic.

Arabic: Carawya, Kardiah, Karoya—; *Bengal:* Jira—; *Bombay:* Vilayatizirah—; *Catalan:* Cumi de prat—; *Cheban:* Gunyun—; *Danish:* Kornmen—; *Dutch:* Karwij—; *English:* Caraway, Common Caraway—; *French:* Anis des Vosges, Carobin, Carvi, Cumin arménien, Cumin de montagne, Cumin des prés, Cumin romain—; *German:* Feldkuemmel, Fischkuemmel, Gemeiner Kuemmel, Kaem, Kalm, Karbei, Kiem, Kim, Koehm, Koem, Kramkuemmel, Kuemmel, Makenn, Makinisch, Mattenkammi, Mattenkuemmel, Wegkuemmlich,

Wiesen Kuemmel—; *Gujerati:* Shajiru—; *Hindi:* Shiajira, Zira—; *Italian:* Caro, Carvi, Comino, Comino dei prati, Comino tedesco, Cumino dei prati, Cumino tedesco—; *Kashmir:* Gunyan—; *Ladak:* Umbu—; *Marathi:* Shahajire—; *Morocco:* Karuya—; *North-Western Provinces:* Zira—; *Norway:* Karve—; *Persian:* Jirah rumi, Karoya—; *Polish:* Karny—; *Portuguese:* Alcaravia, Alcarovia, Alchirivia, Chirivia—; *Punjab:* Zirasiyah—; *Roumanian:* Chimion de camp, Chimien, Chinisor, Secarea, Secarica—; *Russian:* Timon—; *Sanskrit:* Bahugandha, Bhedanika, Bhedini, Hridya, Jarana, Kalajiraka, Kalameshi, Kashmirajiraka, Krishna, Krishnajaji, Krishnajiraka, Nila, Nilakana, Patu, Ruchya, Sugandha, Sushavi, Udgarashodhini, Vantishodhini, Varshakali—; *Spanish:* Alcaravea, Carvi, Cominos de prado—; *Swedish:* Kummin—; *Tamil:* Kekkuvirai, Simaishembu—; *Telugu:* Shimaisapu—; *Urdu:* Shahjirah—.

2. **Carum bulbocastanum** G. D. J. Koch in Nov. Act. Acad. Caes. Leop. (1825) 121.—PLATE 479B.

Glabrous. Root tuberous. Stem 15-75 cm., erect, branched. Leaves 2-3-pinnate, finely dissected, ultimate segments of the lower often 1.3-2.5 cm., of the upper leaves very narrow. Bracts 0, or several, linear, sometimes divided; rays 6-16, 3.8 cm.; bracteoles 0-8, linear; pedicels 10-15, 3-13 mm. Fruit 3-4 mm., yellowish brown, almost viscid; carpels exactly oblong, hardly widened at the middle, semiterete, dorsally subcompressed; ridges thin, distinct; vittae solitary, rather large.

Distribution: Kashmir, 6,000—9,000 ft., Baluchistan.—N. Asia, Europe, N. Africa.

The seeds are used for similar purposes as those of *C. Carvi.*

I found this very useful as a carminative. It is used in Quetta to protect warm clothes and skins against the ravages of insects (B. D. B.).

English: Bulbous Caraway, Great Earth Nut, Tuberous Caraway—; *French:* Terre-noix—; *Hindi:* Kalajirah, Siyajira—; *Kashmir:* Gunyun—; *Kowas:* Zirasiyah—; *Ladak:* Umbhu—; *Sibi:* Zirah—.

3. **Carum roxburghianum** Benth. & Hook. f. Gen. Pl. I, 891. *Apium involucratum* Roxb. Fl. Ind. II (1832) 97.—Plate 480.

An annual about 1 m. high. Root fusiform. Ultimate segments of lower leaves rather broad, of the upper narrowly linear-lanceolate. Bracteoles 4-8, subulate, with scarious ciliate margins. Fruit 2.5-2 mm. long. hispid.

Distribution: Cultivated in many Indian gardens. Very likely a cultivated form of C. stictocarpum C. B. Clarke.

The properties are the same as those of *Apium graveolens* (Yunani).

The seeds are useful in hiccough, vomiting, and pain in the bladder. They form an ingredient of carminative and stimulant preparations, and are useful in dyspepsia.

Arabic: Bazrulkarafs—; *Bengal:* Ajmud, Chanu, Radhuni, Randhoni—; *Canarese:* Ajmodavoma—; *Central Provinces:* Randhuni—; *Deccan:* Ajmudah, Ajmudahajwan—; *Gujerati:* Ajmod, Bodiajamo—; *Hasada:* Otebaranggu—; *Hindi:* Ajmod, Ajmot, Ajmud, Ajmuda—; *Marathi:* Ajmodavova, Koranza—; *Naguri:* Barangguba—; *Persian:* Tukhmekarafs—; *Tamil:* Ashamtagam, Ashamtavomam—; *Telugu:* Ajumodavomam, Ajumodavomaru, Ashumadagavoman—; *Urdu:* Karafas—.

4. **Carcum copticum** Benth. & Hook. f. Gen. Pl. I, 891.—Plate 477B.

An erect annual, 0.3-0.9 m. high, glabrous or minutely pubescent. Leaves rather distant. 2-3-pinnate, ultimate segments 1.3-2.5 cm., all linear. Bracts usually many, linear, sometimes divided; bracteoles 3-5, small, linear. Rays of umbel pubescent. Flowers pure white. Fruit 2 mm., ovoid, muricate, subhispid, carpels dorsally compressed, ridges distinct; vittae solitary, small.

Distribution: Cultivated extensively in Indian gardens, Baluchistan.—Also in Afghanistan, Persia, Egypt, Europe.

The seeds are hot, bitter, pungent; stomachic, appetiser, aphrodisiac, anthelmintic, carminative, laxative; cure ascites, abdominal tumours, enlargement of the spleen, piles, vomiting, abdominal pains;

good for the heart and in toothache; increase biliousness (Ayurveda).

The seeds are bitter and hot; carminative, diuretic, galactagogue, tonic, expectorant, emmenagogue; cure weakness of limbs and paralysis, chest pains; improve speech and the eye-sight; stimulate the intestine; good for ear-boils, liver, spleen, hiccough, vomiting, dyspepsia, kidney troubles, inflammations (Yunani).

In native practice, the fruits are much valued for their antispasmodic, stimulant, tonic, and carminative properties. They are administered in flatulence, atonic dyspepsia and diarrhœa, and often recommended for cholera. They are used most frequently in conjunction with assafoetida, myrobalans, and rock salt. A decoction is supposed to check discharges, and it is therefore sometimes prescribed as a lotion, and often constitutes an ingredient in cough mixture.

The root is diuretic and carminative. It is used in febrile affections and in stomach disorders.

The plant is used as a stomachic in Loralai (Hughes-Buller).

The seed is prescribed for snake-bite (Sushruta) and scorpion-sting (Sushruta, Haritasamhita); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Though a source of thymol the seeds cannot be recommended as an anthelmintic. Thymol is a very effective remedy against hookworms; but its action on other nematodes is distinctly inferior. Moreover, such large doses of it are required in the treatment of hookworm infection that neither the seeds nor their oil can be recommended for the purpose (Caius and Mhaskar).

Arabic: Kamuemulaki, Kamunemaluki, Talibelkhubz—; *Bengal:* Jowan, Juvani—; *Bombay:* Ajwan, Owa—; *Canarese:* Oma, Omu—; *Cutch:* Chohara—; *Egypt:* Choelle—; *English:* Bishop's Weed, Lovage—; *French:* Sison—; *Gujerati:* Ajamo—; *Hindi:* Ajowan, Ajwain—; *Kashmir:* Jawind—; *Kohlu:* Sperkai—; *Kowas:* Ajwain—; *Loralai:* Ajwain—; *Marathi:* Owa—; *Mekhtar:* Sperkai—; *Pampangan:* Damoro—; *Persian:* Nankhah, Nankhwah, Zinian—; *Portuguese:* Ameos—; *Sanskrit:* Agnivardhini, Ajamoda, Ajamodika, Bhukadambaka, Bhumikadambaka, Bhutika, Brahmadarbha, Dipani, Dipya, Dipyaka, Hridya, Kshetrayavanika, Shulahantri, Tikshna-

gandha, Tivragandha, Ugra, Ugragandha, Vatari, Yamanika, Yavagraja, Yavajadipaniya, Yavani, Yavasavha, Yavavha—; *Shahrig:* Sperkai—; *Sinhalese:* Assamodum—; *Tagalog:* Damoro, Lamudio—; *Tamil:* Amam, Omam—; *Telugu:* Omami, Omamu—; *Urdu:* Ajwan—; *Visayan:* Lamudio—.

PIMPINELLA (Riv.) Linn.

Annual or perennial herbs. Leaves simple or compound. Flowers in compound umbels, hermaphrodite or polygamo-monoecious. Bracts of the involucre 0 or few; bracteoles small or 0. Calyx-teeth obsolete or small. Petals usually with long inflexed points, more or less emarginate, retuse or entire. Fruit ovoid or broader than long, laterally compressed, often constricted at the commissure; mericarps subterete or subpentagonal, often dorsally compressed, ridges slender, obscure or prominent; vittae 2-3 in each furrow. Carpophore entire, 2-fid or 2-partite. Seed subterete or dorsally subcompressed, the inner face flat or nearly so.—Species 100. —N. hemisphere, S. Africa.

A. Fruit glabrous or very nearly so
   1. Fruit didymous, broader than long .... 1. *P. heyneana.*
   2. Fruit ellipsoid, rather longer than broad .... 2. *P. saxifraga.*
B. Fruit papillose, glabrous or pubescent .... 3. *P. diversifolia.*
C. Young fruit densely covered with white papillose hairs ...... 4. *P. stocksii.*

Root astringent. Seeds condimentary, stimulant, and carminative.

The following species are used medicinally in Europe—*P. anisum* Linn., *P. magna* Linn., *P. saxifraga* Linn.—; in the Levant—*P. anisum* Linn., *P. magna* Linn.—; in Persia—*P. saxifraga* Linn.—; in China—*P. calycina* Max.—; in Indo China—*P. diversifolia* DC.—; in Egypt—*P. anisum* Linn.—.

OFFICIAL:—The root of *P. magna* Linn. (Germany, Switzerland), and *P. saxifraga* Linn. (Germany, Norway, Switzerland).

The fruit of *P. anisum* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States);=

Anisum vulgare Gaert. (Hungary);=*Sison Anisum* Spreng. (Portugal).

1. **Pimpinella heyneana** Wall. Cat. (1828) 566.—PLATE 477C.

Annual; root fusiform; stem erect, 0.5-0.9 m. high, with ascending glabrous branches. Leaves 3-foliolate, smaller upwards, the lateral leaflets usually ternate, the terminal leaflet sometimes ternate, but often simple, entire or lobed; ultimate segments of the lower cauline leaves usually stalked, ovate-lanceolate, 2-5 by 1-2 cm., very acute, sharply serrate, glabrous or nearly so, base tapering; ultimate segments of the upper cauline leaves often much narrower; common petioles 2.5-3.8 cm. long, dilated and ciliate at the base. Primary umbels 6-20-rayed, the rays unequal, very slender, 2.5-5 cm. long, glabrous; bracts 0. Partial umbels 4-12-flowered; pedicels filiform, very unequal, 3-10 mm. long; bracteoles 1-2, linear, 3-6 mm. long, or 0. Styles short. Fruit subglobose, 1.5 mm. diam., glabrous; primary ridges slender.

Distribution: Konkan, S. M. Country, N. Kanara, Deccan, Circars, Ceylon, Chittagong.

The root is used in fever (Wood).
Chota Nagpur: Marcheia, Tirio—.

2. **Pimpinella saxifraga** Linn. var. *disectifolia* C. B. Clarke in Hook. f. Fl. Brit. Ind. II, 685.

Glabrous or very nearly so, branched from the root. Stem 20-40 cm., curved, striate, little leafy upwards. Leaves oblong, radical leaves pinnate, pinnae 1.3-2 cm. diam., round or elliptic toothed, upper sub-2-pinnate. Bracts 0; rays 5-10, 0.3-3.8 cm., unequal, stout, ascending; bracteoles 3-5, 4 mm., linear; pedicels 5-10; 1.2-2.5 mm. Petals often pink or purplish. Fruit 3 mm., ellipsoid, rather longer than broad; carpels ½-terete, subpentagonal, dorsally subcompressed; inner face plane; ridges thin, distinct; vittae 2-3 in each furrow; carpophore stout, often 2-partite. Seed concave on the inner face.

Distribution: Kashmir.—Europe, N. & W. Asia.

In Europe, the acrid root has been used as a lithontriptic. The root and the herb are considered aromatic, carminative, stomachic. An infusion of the herb is given to relieve flatulent indigestion.

Dutch: Pimpernel—; *English:* Burnet Saxifrage, Common Burnet, Lesser Burnet, Saxifrage Burnet—; *French:* Petit boucage—; *German:* Kleiner Bibernell, Binzelwurzel, Blauwurzel, Blutstropfenkraut, Bockspetersilie, Bockswurz, Engherste, Herrgottsbaertlein, Pfefferwurzel, Pimpinelle, Steinbibernell, Steinpeterlein, Theriakworzel—; *Italian:* Pimpinella, Tragoselino becchino—; *Norway:* Pimpinelle—; *Portuguese:* Pimpinella—; *Roumanian:* Patrunjel de camp—; *Russian:* Dikiy bedrenets—; *Spanish:* Saxifraga menor—.

3. **Pimpinella diversifolia** DC. Prodr. IV, 122.

Hairy or pubescent; stems 0.6-1.5 m. Leaves 1-pinnate; leaflets 3 or 5, rarely reduced to only 1, very variable in shape, lanceolate 3.8-12.5 by 2.5-5 cm., or sometimes, in the radical leaves, broadly ovate and about 2.5 cm. across, coarsely or finely, irregularly toothed, usually cordate, often long-pointed. Bracts none or 1-2. Rays 10-20. Bracteoles 3-8 or none. Flowers white, 8-16 in an umbel; stalks in fruit elongated. Fruit roughly pubescent.

Distribution: Throughout the Himalaya, 4,000—10,000 ft., Khasia Mts.—China.

The herb is used as a carminative.
Indo China: Kho da thai—.

4. **Pimpinella stocksii** Boiss. Fl. Or. II, 865.

Puberulous, stem slender, dichotomously branched. Radical leaves long-petioled, lanceolate in outline, pinnatisect, trijugate; segments remote, petiolulate, running down into small oblong linear 2-3-fid segments; stem-leaves sessile, consisting of a few setaceous elongate laciniae. Involucre and involucel 4-5-leaved. Leaflets lanceolate, broadly membranous, ciliate, almost as long as the pedicels. Young fruit ovate globose, densely covered with white papillose hairs. Stylopods contiguous depressed with a cupular margin. Styles straight, divergent, rather long.

Distribution: Baluchistan.

The grain is crushed, mixed with water, hot or cold, and swallowed as a remedy against pain in the stomach.

Baluchistan: Harpir—; *Brahui:* Isbot—.

SESELI Linn.

Herbs, glabrous or pubescent. Leaves 2-3-pinnate or twice 3-partite. Umbels compound; bracts 0 few or many, undivided or pinnate; bracteoles several or many. Calyx-teeth minute, lanceolate or linear, or 0. Petals emarginate, white. Fruit oblong, ovate or circular, not laterally compressed, broadest at the commissure; carpels ½-terete, inner face plane; ridges strong, obtuse or subacute, lateral hardly larger than the dorsal; vittae in each furrow solitary, usually prominent; carpophore 2-partite, 2-fid or entire; disk not prominent on the fruit.—Species 60.—Europe, Africa, Asia, Australia.

Fruit aromatic, stimulant and carminative.

The following are used medicinally:—in Europe—*S. tortuosum* Linn.—; in China and Indo China—*S. libanotis* Koch.—.

1. **Seseli indicum** W. & A. Prodr. 371.—*Ligusticum diffusum* Roxb. Fl. Ind. II (1832) 92.—PLATE 481.

An erect or diffuse annual, 10-30 cm. high. Lower leaves 2-pinnate, secondary pinnae ovate, lobed, hispidly pubescent. Bracts 4-5, 1.3 cm. narrowly lanceolate, caudate, pubescent; bracteoles similar, but smaller. Flowers white or pink. Calyx-teeth 0. Fruit 2-2.5 mm., subglobose, glabrous or hispid; ridges thick, often pale yellow; carpels ½-terete, vittae distinct, carpophore entire, disk prominent, styles spreading.

Distribution: Sub-Himalayan tracts from Dehra Dun to Gorakhpur, Bundelkhand, Assam, Central Bengal, Coromandel Coast.

The seed is used as a medicine for cattle. It is also said to be carminative.

I have found the seeds to act as a good anthelmintic for round worms; and they are also stimulant, carminative, and stomachic.—Dose of simple powder, from 20 grains to a drachm (Moodeen Sheriff).

Bengal: Banjoan—; *Marathi:* Kirminjiajwan—; *Sanskrit:* Vanayamani—.

PYCNOCYCLA Lindl.

Perennial herbs; branches rush-like, few-leaved. Leaves pinnately dissected, ultimate segments narrow. Rays of the umbels very short; bracts and bracteoles many, small, umbellules containing one central sessile fertile flowers, and several pedicelled males. Calyx-tube hairy; teeth small, lanceolate, often unequal. Petals obovate, emarginate, hairy. Fruit oblong-lanceolate, hairy terete (one carpel is frequently aborted), surrounded by the inflated pedicels of the barren flowers, receptacle not (or very obscurely) enlarged; carpophore 0; carpels ½-terete, inner face deeply grooved; primary ridges filiform, minute, lateral at the margin of the broad commissure; vittae numerous, very slender, usually one under each primary ridges and several still more minute scattered in the endocarp. Seed lunate or with a T-shaped groove on the inner face.—Species 7.—Abyssinia and N.-W. India.

The genus is therapeutically inert.

1. **Pycnocycla aucheriana** Boiss. in Ann. Sc. Nat. (1844) 88.

Glabrous, branches suffruticose, very short. Leaves rigid, above canaliculate, cut into 3-5 long sharp spines. Umbels very long-peduncled, compact, very shortly multi-radiate, tomentose; involucral leaves spinelike, 3 times as long as the umbellule; leaves of the involucel lanceolate-subulate, as long as the flowers; calyx-teeth subulate.

Distribution: Baluchistan.—Persia, Arabia.

When people in Baluchistan are thirsty they chew the leaves of this small bush. It is said to be very cooling (Hotson).

Baluchistan: Bibi, Bibibuto, Butag, Kemar, Sagidontan—.

FOENICULUM Tourn. ex Linn.

Tall glabrous herbs, sometimes annual. Leaves 2-3-4-pinnate, ultimate segments linear. Bracts 0; bracteoles 0, or few small and

linear. Calyx-teeth 0. Petals yellow, emarginate. Fruit not laterally compressed, oblong or ellipsoid; carpels ½-terete; ridges prominent, subequal; furrows 1-vittate; carpophore 2-partite. Seeds somewhat dorsally compressed, inner face slightly concave.—Species 4.—Mediterranean, Europe.

The root is aperient; the seeds are aromatic, stimulant, carminative, and diuretic.

F. vulgare Mill. is used medicinally in Europe, China, Indo China, Malaya, and the Philippine Islands; *F. piperitum* DC. in Europe.

OFFICIAL:—The fruit of *F. capillaceum* Gilib. (Belgium, Denmark, Sweden); *F. vulgare* Gaertner (Austria),—Mill. (Germany, Great Britain, Holland, Hungary, Japan, Norway, Russia, Switzerland, Turkey).

The root and fruit of *F. dulce* DC. and *F. vulgare* Mill.=*F. officinale* All. (Italy).

The root, leaf, and fruit of *F. dulce* DC. (France).

1. **Foeniculum capillaceum** Gilb. Fl. Lithuan. IV (1781) 40.—*F. vulgare* Gaertn. Fruct. I, 105, fig. 5.—PLATE 477D (under *F. vulgare* Gaertn.).

Stock perennial, but usually of short duration. Stems erect, branched, 0.6-0.9 m. high, or when cultivated, still taller. Leaves 3 or 4 times pinnate, with very narrow, linear or subulate segments rather stiff in dry situations, very slender when cultivated. Umbels rather large, of 15, 20, or more rays, more or less glaucous. Fruit about 6 mm. long, the vittae very conspicuous.

Distribution: Extensively cultivated. Apparently a native of S. Europe, but now diffused over temperate and subtropical regions of the world.

The seed is bitter, sweet, hot; laxative, aphrodisiac, stomachic, appetiser, anthelmintic, alexiteric; cures "tridosha", eye diseases, burning sensation, fever, thirst, wounds, dysentery, "vata" biliousness, leprosy (Ayurveda).

The leaves improve the eyesight.—The seed is sharp, sweet; carminative, galactagogue, diuretic, stimulant; cures intestinal troubles when applied to the abdomen of children; useful in diseases

of the chest, the spleen, the kidney, in headache, amenorrhœa, cough, and asthma; lessens inflammations; strengthens the eye (Yunani).

Used as stimulant, aromatic, and carminative. The root is regarded as purgative, and the leaves diuretic. In Madras, the fruits are used in venereal diseases.

It is grown in gardens in Kharan and used as a cure for stomach-ache (Huges-Buller).

In Europe, the seed is considered stimulant, carminative, and stomachic. It is an admirable corrective of flatulence; it relieves griping of the bowels with distension, comforts belly-ache in the infant, and promotes female monthly regularity.

The fruit, in combination with other drugs, is recommended for the treatment of snake-bite (Vagbhata); but it is not an antidote to snake-venom (Mhaskar and Caius).

The oil from the seed is a fairly good vermicide against hook-worms in doses of 60 minims (Caius and Mhaskar).

Arabic: Raziyanaj—; *Bengal:* Mauri, Panmuhori—; *Bombay:* Barishopha, Panmohuri—; *Canarese:* Badisopu—; *Catalan:* Fonoll—; *Chinese:* Huai Hsiang, Siao Houi Hiang—; *Danish:* Fennikel—; *Dutch:* Venkel—; *English:* Fennel, Finkel, Sweet Fennel—; *French:* Aneth doux, Aneth fenouil, Anis doux, Anis de France, Anis de Paris, Fenouil commun, Fenouil doux, Fenouil de Florence, Fenouil de Malte, Fenouil officinal, Fenouil sucré, Fenouil des vignes—; *German:* Fenchel, Fenkahl—; *Greek:* Malathron, Marathron—; *Gujarat:* Variari, Variyali—; *Harboi Hills:* Rizeh—; *Hindi:* Barisaunf, Saunf, Sonp, Sont—; *Indo China:* Hoï huong—; *Italian:* Cartucci, Fenocchio, Finocchio—; *Kharan:* Raz—; *Kowas:* Badian—; *Languedoc:* Fenou—; *Malaya:* Siao hui, Siew woo—; *Malta:* Sweet Fennel, Finocchini, Finocchio di Bologna, Busbies, Busbies tal gidra—; *Marathi:* Badishep—; *Norway:* Fennikelfroe—; *Persian:* Badiyan—; *Philippines:* Anis—; *Portuguese:* Funcho—; *Roumanian:* Marar—; *Russian:* Ukrop—; *Sanskrit:* Ahichhatra, Avakapushpi, Bhuripushpa, Chhatra, Gandhadhika, Ghosha, Ghoshawati, Karavi, Madhavi, Madhura, Madhuri, Madhurika, Mangalya, Mishreya, Misi, Potika, Pushpavha, Sanghatapatrika, Shaleya, Shalina, Shatapatrika, Shataprasuna, Shatapushpa, Shitashiva,

Sugandha, Supushpika, Talaparni, Tapasapriya, Trishahara, Vanapushpa—; *Spanish:* Hinojo—; *Swedish:* Faenkael—; *Tamil:* Perunjiragam, Sohikirai—; *Telugu:* Peddajilakaramu—; *Turki:* Azapa, Badyan—; *Turkish:* Raziyane—; *Urdu:* Sonf—.

PRANGOS Lindl.

Tall, perennial herbs. Leaves 3-4-pinnate. Umbels compound; bracts and bracteoles many. Calyx-teeth 0. Petals emarginate, yellow. Fruit oblong, commissure broad; carpels ½-terete, dorsally compressed, inner face nearly plane but the epicarp there thin, introflexed in a deep T-shaped groove; epicarp spongy; primary ridges large, subequal or the lateral larger; vittae small, numerous; carpophore 2-partite. Seed dorsally compressed, inner face slightly concave, with a deep narrow T-shaped groove.—Species 36.—Mediterranean, W. and Central Asia.

The genus is therapeutically of little importance.

1. **Prangos pabularia** Lindl. in Quart. Journ. Sc. XIX (1824) 7.—PLATE 482A.

Stem 1.2-1.5 m. Leaves 30-45 cm., very compound, ultimate segments 1.3-2.5 cm., setaceous. Umbels 15-45 cm. diam., sometimes very compound. Bracts 4-8, 2 cm., linear. Pedicels 15-25, 4-8 mm., whereof 4-8 may produce fruit. Fruit 6-20 mm., ridges undulate, furrows rough with corrugations, wings 3 mm. broad; style-bases depressed; styles short, early reflexed. Seeds 2-2.5 mm. diam.

Distribution: Kashmir, 6,000—11,000 ft.—Afghanistan.

The fruit has a good smell and a sharp, sweet taste; carminative, laxative, stomachic, stimulant, diuretic, emmenagogue, alexiteric, tonic to the liver; lessens inflammations and griping pain; used in lumbago (Yunani).

The fruit or seed is said to be stomachic. The roots are a valuable remedy in the cure of itch; they are used as diuretic and emmenagogue.

In Bombay, the hakims use the fruit as stimulant and carmina-

tive. It is said to promote explusion of the fœtus. It also possesses diuretic properties.

In Kashmir, the fruit is used in decoction to cure the rot in sheep. The plant is considered heating.

The seed is used as an aphrodisiac (Balfour).

Bombay: Fiturasaliyun—; *Hindubagh:* Baatshah—; *Persian:* Badiankohi, Karfaskohi—; *Punjab:* Fiturasaliyun—; *Pushtu:* Komal, Prangos—; *Urdu:* Badiyanekhatui, Fitarasaliwan—.

ANGELICA (Riv.) Linn.

Herbs, usually tall. Leaves 1-2-3-pinnate, pinnae toothed, usually large. Umbels compound, rays many; bracts few, narrow, or 0; bracteoles small. Calyx-teeth obsolete. Petals obovate, emarginate, white or lurid purple. Fruit ovoid or ellipsoid, dorsally compressed commissure broad; lateral ridges broadly winged, dorsal and intermediate not prominent; carpels complanate, broadly margined; furrows 1-2-vittate; carpophore 2-partite. Seed much dorsally compressed, inner face plane concave or almost grooved.—Species 60.—N. temperate and arctic regions, New Zealand.

The root is aromatic, stimulant, diuretic, diaphoretic, carminative, and emmenagogue.

The following species are used medicinally in Europe—*A. sylvestris* Linn.—; in China—*A. grosseserrata* Max., *A. kiusiana* Max., *A. polymorpha* Max., *A. sylvestris* Linn.—; in Indo China—*A. inaequalis* Max., *A. kiusiana* Max., *A. polyclada* Franch., *A. sylvestris* Linn.; in Malaya—*A. polymorpha* Max., *A. sylvestris* Linn.—.

OFFICIAL:—The root of *A. archangelica* Linn. (Belgium, Switzerland);=*Archangelica officinalis* Hoffm. & Koch (Hungary, Portugal); the root and leaves of *A. archangelica* Linn. (France).

1. **Angelica glauca** Edgew. in Trans. Linn. Soc. XX, 53.—PLATE 482B.

A glabrous herb; stem erect, hollow, 1.2-3.6 m., finely grooved. Leaves usually large, 1-3-pinnate; leaflets often in threes or reduced to 3, sometimes to 1, ovate or lanceolate, undivided or lobed,

irregularly and sharply toothed; upper surface dark green, lower glaucous. Umbels compound, long-stalked. Bracts several, linear, up to 2.5 cm. Rays many, nearly equal. Bracteoles many, linear, 6 mm. Flowers white or purple, many in an umbel. Calyx-teeth none. Fruit glabrous, flattened, oblong, 13 by 6 mm.; dorsal and intermediate ridges not winged, lateral ridges expanded into membranous, broad, free wings so that the fruit is surrounded by a double or 2-leaved border.

Distribution: W. Himalaya, from Kashmir to Simla, 8,000—10,000 ft.

The herb is a good cordial and stimulant; useful in flatulence and dyspepsia.

Punjab: Chora, Chura—.

FERULA Tourn. ex Linn.

Perennial herbs. Leaves 2-4-pinnatifid or 2-4-pinnate. Umbels compound. Flowers yellow, often polygamous. Calyx-teeth obsolete. Petals ovate, obtuse, or emarginate. Fruit orbicular or ellipsoid, much compressed dorsally; lateral ridges winged, dorsal and intermediate filiform or obscure; vittae many or few; carpophore 2-partite. Seed much dorsally compressed, inner face plane.—Species 60.—Mediterranean, Central Asia.

1. Leaves pubescent at least when young, lower leaves ovate .... 1. *F. narthex.*
2. Like the preceding except that the leaves are closely crenate or doubly crenate or almost serrate .... 2. *F. jaeschkeana.*

The root is sedative or stimulant. The gum-resin is stimulant, expectorant, and antispasmodic.

The following are used medicinally in Europe—*F. communis* Linn., *F. ferulago* Linn., *F. galbaniflua* Boiss. & Buhse, *F. schair* Borsz.—; in Asia Minor—*F. orientalis* Linn.—; in Syria—*F. hermonis* Boiss.—; in Samarkand—*F. sumbul* Hook. f.—; in Persia —*F. assafoetida* Linn., *F. persica* Willd., *F. rubricaulis* Boiss., *F. szowitsiana* DC.—; in China—*F. foetida* Reg.—; in Morocco—*F. tingitana* Linn.—.

OFFICIAL:—The gum-resin of *Ferula spp.* (Austria, Belgium, Denmark, Germany, Great Britain, Japan, Norway, Spain, Sweden,

Switzerland, United States); *F. alliacea Boissier* (Spain); *F. asafoetida* Linn. (Italy, United States); *F. Asa foetida* Linn. (Denmark, France, Japan, Norway, Russia)=*Scorodosma foetidum* Bunge (Portugal, Spain); *F. Assa-foetida* Linn. (Belgium, Germany, Holland)=*F. foetida* Regel, *F. scorodosma* Bentley and Trimen (Switzerland); *F. erubescens* O. Berg.=*F. rubricaulis* Boissier (Portugal); *F. foetida* Regel (Belgium, Great Britain, Holland, Japan, United States),—(Bunge) Regel (Germany, Russia); *F. galbaniflua* Boissier (Norway),—Boiss. & Bushe (France),—Boiss. & Buhse (Austria, Belgium, Denmark, Germany, Holland, Japan, Portugal, Russia, Spain, Switzerland); *F. Narthex* Boiss. (Austria, Belgium, France, Germany, Japan, Norway, Russia)=*Narthex asa foetida* Falconer (Portugal)=*N. Assafoetida* Falconer (Spain); *F. rubricaulis* Boissier (Austria, Great Britain, Norway, Spain); *F. scorodosma* Bentham & Hooker (Austria).

1. **Ferula narthex** Boiss. Fl. Or. II, 994.—*Narthex Asa-foetida* Falc. in Trans. Linn. Soc. XX, 285; Bot. Mag. t. 5168.—Plate 483 (top figure).

Stem 1.5-2.4 m. Leaves pubescent, at least when young; lower leaves 30-60 cm., ovate, cauline sheaths large, from which spring simple or scarcely compound umbels. Secondary and tertiary pinnae decurrent, entire or very irregularly crenate-serrate. Terminal umbel large, compound, leafless. Ovary glabrous. Fruit 8 by 5 mm. Vittae manifest, broad, 1 (rarely 1-2) in the dorsal furrows, usually occupying the whole furrow, and as long as the carpel; commissural usually 4, 2 slender sometimes added.

Distribution: Baltistan, Astor.

The gum is bitter, hot, pungent; digestible, stomachic, laxative, analgesic, anthelmintic, carminative; whets the appetite; cures "kapha" and "vata", dyspepsia; good in diseases of the heart; used in abdominal tumours, ascites, jaundice, caries of the teeth; increases biliousness (Ayurveda).

The stem has a sharp taste and flavour; tonic to the brain and the liver; emmenagogue, bechic; lessens all inflammations; good in paralysis.—The gum has a bad taste and a bad smell; harmful to

cold constitutions; anthelmintic, emmenagogue, tonic; useful in paralysis, giddiness, deafness, asthma, dyspnœa of children, rheumatism, sore eyes, ophthalmia, ulcers of the eye, eye opacities, dry cough; improves the throat and the voice; relieves griping, troubles of the liver and the spleen (Yunani).

The leaves possess diaphoretic and carminative properties.

The gum-resin is a powerful antispasmodic, expectorant and anthelmintic, a nervine stimulant and a feeble laxative. It is useful in hysteria and hysterical affections, also in spasmodic affections, such as asthma, whooping cough, angina pectoris, flatulent colic, etc. It produces remarkable effects in the advanced stages of pneumonia and bronchitis in children.

The gum-resin is used as a condiment. It is very efficacious in flatulent colic. In ringworm, it is applied as a paste.

In the Harboi Hills the leaves are given to persons suffering from rheumatism (Hughes-Buller). In other parts of Baluchistan the seeds are used to expel worms from children (Masson).

Asafœtida is recommended for the treatment of snake-bite (Charaka, Sushruta, Rasaratnakara) and scorpion-sting (Charaka, Sushruta, Vagbhata, Vrindamadhava, Bhaishajyaratnawali, Chakradatta, Ashtangasangraha, Subhodavaidyaka). In Ceylon, the gum-resin is boiled in cocoanut milk and applied to the part bitten by the snake; a small quantity is dissolved in water and about half-a-teaspoonful is poured into each nostril (Roberts).

Asafœtida is useless in the antidotal treatment of snake-bite; it is also useless when used as an errhine or applied to the part bitten (Mhaskar and Caius). Nor is it an antidote to scorpion-venom (Caius and Mhaskar).

Afghanistan: Anguzakema, Khorakema, Kurnekema—; *Annam:* A nguy—; *Arabic:* Haltit, Hiltut—; *Bombay:* Hing, Hingra—; *Chinese:* A Wei, O Oui—; *Denmark:* Dyvelsaraek—; *Dutch:* Asafœtida, Duivels Drek—; *English:* Asafœtida, Devil's Dung, Persian Fennel-Giant—; *French:* Asafœtida, Ase fétide, Ferule fétide, Férule de Perse, Laser cyrénaïgue—; *German:* Asafœtida, Steckenkraut, Stinkenderasand, Teufels Dreck—; *Greek:* Skordolasaron—; *Gujarat:* Hing—; *Harboi Hills:* Ushi—; *Hindi:* Hing,

Hingra—; *Hindubagh:* Ushghalai—; *Italian:* Assafetida, Zaffetica—; *Kashmir:* Anjudan—; *Norway:* Dyvelsadraek—; *Nushki:* Hing, Hinghi—; *Persian:* Angadana, Anguza, Anguzeh—; *Portuguese:* Assafetida—; *Roumanian:* Aerel, Cacatudracului—; *Russian:* Vonyuchaya Kamed, Vonyuchka—; *Sanskrit:* Agudagandha, Balhika, Bhedana, Bhutari, Dipta, Grihini, Hingu, Hinguka, Jantughna, Jantunashana, Jarana, Jatu, Jatuka, Kesara, Madhura, Pinyaka, Rakshoghna, Ramatha, Ramathadhvani, Sahasravedhi, Shuladvit, Shulahrita, Shulanashaka, Supadhupana, Ugragandha, Ugravirya—; *Sind:* Vaghayani—; *Spanish:* Asafetida—; *Tamil:* Perungayam—; *Urdu:* Anjadana, Hing—; *Zarghun Hills:* Hing, Hinja—; *Zhazhbazha Hills:* Hinga, Raghband—.

2. **Ferula jaeschkeana** Vatke Append. in Sem. Hort. Berol. (1876) 2.—*F. fœtidissima* Regel & Schmalh. in Garten Fl. (1878) 195-198, t. 944.—Plate 483.

Stem, leaves and inflorescence as in F. narthex, except that the leaves are closely crenate or doubly crenate or almost serrate; secondary and tertiary pinnae decurrent. As in F narthex, the fruiting corymb often appears elongate subpaniculate, sometimes divaricate and corymbose; peduncles bearing nearly simple umbels also proceed from the large sheaths of the cauline leaves. Carpel 16 by 10 mm., vittae very large solitary in each furrow.

Distribution: Kashmir, Turkestan.

The gum-resin is applied to wounds and bruises by the inhabitants of Kuram Valley.

Peucedanum (Tourn.) Linn.

Perennial (rarely annual) usually glabrous herbs. Leaves pinnately or ternately decompound (rarely simply pinnate). Flowers white or yellow (rarely pink), often polygamous, those of the central umbels usually perfect. Umbels compound, usually with many rays; bracts various; bracteoles many, rarely minute or 0. Calyx-teeth obsolete or more or less prominent, small. Petals obovate, cuneate, or subovate, inflexed at the tip, emarginate or entire, not radiant.

Disk undulate with flattened margin; stylopods usually small. Ovary glabrous. Fruit ellipsoid, oblong, or suborbicular, dorsally much compressed, more or less acutely winged on the margin; mericarps slightly convex on the back, the primary dorsal and intermediate ridges filiform or little elevated, the lateral dilated, winged; vittae usually solitary in the furrows reaching the base of the fruit or rarely abbreviated, the commissural vittae 2-6. Seed flat, slightly curved on the back, the face flat or rarely somewhat concave.—Species 180. —Europe, Asia, Africa, America.

1. Ultimate segments of the leaves 1.3-2.5 cm., linear .... 1. *P. graveolens.*
2. Ultimate segments of the leaves 1.3-2.5 cm., linear-oblong or ovate, entire or remotely sparingly toothed; bracts absent or very small .... 3. *P. dhana.*
3. Ultimate segments of the leaves 2.5-5 cm., serrate; bracts prominent .... 2. *P. grande.*
4. Segments oblong-cuneate, subdecurrent into short, triangular, acute laciniae .... 4. *P. aucheri.*
5. Leaves twice ternately compound, with leaflets on the lower leaves very large, ovate, acuminate and strongly serrate, upper lanceolate to linear and uppermost occasionally filiform .... 5. *P. nagpurense.*

The root is antispasmodic and diuretic; the fruit, and sometimes the leaves and stem, is aromatic, stimulant, and carminative.

The following species are used medicinally in Europe—*P. austriacum* Koch., *P. cervaria* Cusson, *P. graveolens* Benth., *P. officinale* Linn., *P. oreoselinum* Moench., *P. palustre* Moench.—; in China and Indo China—*P. graveolens* Benth.—; in Malaya—*P. terebinthaceum* Fisch.—; in North America—*P. officinale* Linn.—; in Guinea—*P. fraxinifolium* Hiern.—; in South Africa—*P. capense* (Thunb.) Sond., *P. galbanum* Benth. & Hook., *P. magaliesmontanum* Harv., *P. tenuifolium* Thunb.—.

1. **Peucedanum graveolens** Benth. & Hook. f. Gen. Pl. 1, 919.—*Anethum Sowa* Roxb. Hort. Beng. 22.—Plate 484.

A glabrous perennial herb, 30-90 cm. high. Leaves 2-3-pinnate; ultimate segments 1.3-2.5 cm., linear. Bracts and bracteoles 0; pedicels many. Petals yellow. Styles small. Fruit 4 by 2 mm., narrowly winged, 2-3 times as broad as thick; dorsal intermediate ridges distinct, slender; vittae large, solitary in each furrow, 2 on the commissure.

Distribution: Throughout tropical and subtropical India, often cultivated.—Cultivated in S. Europe and W. Asia.

The seed is sharp, hot, bitter; stomachic, antipyretic, carminative, anthelmintic; digestible; cures "vata", "kapha", ulcers, abdominal pains, eye diseases, uterine pains; causes biliousness (Ayurveda).

The fruit is hot, bitter; carminative, antidysenteric, stomachic, alexiteric, diuretic, laxative, emmenagogue, maturant, vulnerary; relieves griping, pains due to cold, hiccough, earache; good for liver, spleen, bladder, chest; useful in gleet and syphilis; used for piles (Yunani).

The fruit is used as a condiment and medicine. An infusion of it is given as a cordial drink to women after confinement. The leaves moistened with oil are used as a stimulating poultice or suppurative.

The dried ripe fruits are carminative and stomachic. In children's complaints, such as flatulence, disordered digestion, etc., it is an excellent remedy, mostly given in the form of Dillwater, well known to every English mother and monthly nurse.

In doses of 60 minims anethol is a fairly potent vermicide for hookworm (Caius and Mhaskar).

Arabic: Shavit, Shubit—; *Bengal:* Shulupa, Sowa, Sulpa, Sulpha—; *Bombay:* Baluntshep, Shepu, Shopha, Shupa, Suva—; *Burma:* Samyeit—; *Catalan:* Anet—; *Chinese:* Shih Lo—; *Deccan:* Sayi—; *Dutch:* Dille—; *English:* Anet, Dill, Dilly—; *French:* Anet, Aneth, Aneth fétide, Aneth odorant, Anethum, Ecarlate, Fenouil bâtard, Fenouil de porc, Fenouil puant—; *German:* Dill—; *Greek:* Anithos—; *Gujarat:* Suah, Surva—; *Hindi:* Sowa, Soya, Sutopsha—; *Indo China:* Rau thia la, Thia la—; *Italian:* Aneto, Finocchio fetido—; *Kashmir:* Soi—; *Kumaon:* Soya—; *La Reunion:* Anis puant—; *Marathi:* Balantashopa, Shepu, Shopha, Shupa, Suva—; *North-Western Provinces:* Sawa, Sowa, Soya—; *Persian:* Shol—; *Portuguese:* Endro—; *Punjab:* Soya—; *Roumanian:* Marar—; *Russian:* Anit, Kopior, Ukrop—; *Sanskrit:* Ahichhatra, Atichhatra, Avakpushpi, Bahala, Chhatra, Ghosha, Karavi, Madhavi, Misi, Poti, Pushpavha, Sanghatapatrika, Shaleya, Shalina, Shatakshi,

Shatapatrika, Shataprasana, Shatapushpa, Shatapushpika, Shatavha, Shipha, Shitashiva, Shophaka, Supushpika, Talaparni, Vajana, Vajrapushpi—; *Sinhalese:* Sathakuppai—; *Spanish:* Eneldo—; *Tamil:* Satakkuppi—; *Telugu:* Sompa—; *Urdu:* Soya—.

2. **Peucedanum grande** C. B. C. in Hook. f. Fl. Brit. Ind. II, 710;—PLATE 484A.

Glabrous, 0.9 m. high; root large, woody, perennial; stem erect, grooved, as thick as the little finger at the base. Leaves mostly radical, bipinnate, 20-30 cm. long (including the common petiole which is 5-12.5 cm. long); pinnae usually 2 pairs and a terminal leaflet, the lowest pair ternately divided, with petioles 2-2.5 cm. long, the upper pair often simple, sessile or nearly so, the terminal leaflet 3-lobed nearly to the base, the ultimate leaflets 5-5.7 by 3.2-3.8 cm., with deeply and irregularly gashed and serrate margins, the serratures ending in a stiff hard bristle: Cauline leaves usually ternate, very variable in size and shape, usually deeply lobed (sometimes almost entire), with crenate-serrate margins and petioles much dilated at the base. Flowers yellow. Calyx-teeth 5, short, triangular. Petals 2 mm. long, ovate-oblong, with a long inflexed acumen. Primary umbels 10-20-rayed, the rays unequal, 2.5-6.3 cm. long; bracts 5, herbaceous, 1.3 cm. long, ovate-oblong, acuminate. Partial umbels 10-20-rayed; pedicels 6-13 mm. long; bracteoles 5, oblong, acute, 4 mm. long. Ovary glabrous. Fruit obovate, 10-13 mm. long, narrowly winged; dorsal and intermediate ridges prominent, the furrows 1-vittate, the vittae nearly as long as the fruit; lateral usually 2-vittate, the vittae abbreviated; commissural vittae 4, abbreviated.

Distribution: Konkan, W. Ghats, Deccan.

The herb is considered carminative, stimulant, and tonic.
Bombay: Baphali—; *Hindi:* Duku—; *Persian:* Duku—.

3. **Peucedanum dhana** Ham. in Wall. Cat. 7216.

A glabrous perennial herb. Stems 15-60 cm., naked upwards. Leaves twice or thrice 3-partite, or sub-2-pinnate; ultimate segments up to 5 cm. long, linear-oblong or ovate, entire or sparingly toothed.

Bracts 3-5, 6 mm. long, linear or linear-lanceolate. Rays 5-10, bracteoles 4-8, linear; pedicels many, 6 mm. Flowers small, yellow. Calyx-teeth obsolete. Styles long. Carpels 6 mm., much compressed, subquadrate; dorsal and intermediate ridges filiform, obscure; lateral with a wing as thick as the seed; dorsal furrows 1-vittate, lateral 2-vittate, vittae nearly as long as the carpels.

Distribution: W. Himalaya up to 7,000 ft., N. Bengal.

The root is used as a tonic by the Bhumias (Haines).

Bhumij: Bandraj—.

4. **Peucedanum aucheri** Boiss. Ann. Sc. Nat. (1844) 315.

Quite glabrous, stem terete, dichotomously branched, naked except for the short scarious sheaths. Radical leaves ternatisect, the divisions petiolulate, pinnatisect. Segments oblong-cuneate, subdecurrent into short triangular, acute laciniae. Rays 8-12-radiate. Leaves of the involucre and of the involucel oblong-acuminate, broadly white-membranous. Petals white, obovate, emarginate. Fruit almost as long as the pedicel, narrowly elliptic, acute, narrowly margined. Ridges very thin, the vittae narrow, commissures 2, distant.

Distribution: Baluchistan.—Persia.

At Khawas in Baluchistan the seeds are taken to cure indigestion (Hughes-Buller).

Khawas: Raghbel—.

5. **Peucedanum nagpurense** Prain Bengal Pl. 540.

An erect stout herb 0.9-1.35 m. high with a fusiform root and striate polished stems. Leaves twice ternately compound with leaflets on the lower leaves very large ovate acuminate and strongly serrate, upper lanceolate to linear and uppermost occasionally filiform. Flowers green or brownish, petals oblong-lanceolate with an inflexed tip. Cocci elliptic oblong 7.5-10 mm. long, broadly winged, the wings projecting both ends, dorsal ridges fine but distinct.

Distribution: Bihar and Orissa.

The root is used as a stomachic.

Hasada: Epelom—; *Mundari:* Baghia, Baghiarutu, Ependom, Ependong, Oponom—; *Naguri:* Turi—; *Uriya:* Epondom, Oponom, Triosinghi—.

HERACLEUM Linn.

Herbs, biennial or perennial, never quite glabrous. Leaves 1-2-3-pinnate, segments never minute nor filiform. Umbels compound; rays usually many; bracts few simple, or 0, rarely many foliaceous; bracteoles many, rarely divided. Flowers polygamous, often radiant, white or yellowish. Calyx-teeth obsolete, rarely small linear-lanceolate. Petals obovate, emarginate or 2-fid. Ovary hairy or pubescent. Fruit orbicular obovate or elliptic, much dorsally compressed; dorsal and intermediate ridges small or 0, lateral usually winged or rarely acute; vittae usually solitary in each valley, as long as the carpel or abbreviated and dilated below; carpophore 2-partite. Seed much dorsally compressed, plano-convex.—Species 70.—Temperate and tropical mountains.

H. sphondylium Linn. is used medicinally in Europe.

1. **Heracleum wallichii** DC. Prodr. IV. 195.

Glabrescent upwards; stem 0.9-1.2 m., white-hirsute beneath the nodes. Leaves serrate, pilose above and on the nerves beneath, upper leaves 3-partite or pinnate. Bracts 1-2, 6 mm. linear, deciduous or 0; rays 6-8, 2.5-6.3 cm., glabrous; bracteoles 0-5, 2 cm., linear; calyx-teeth linear, prominent; pedicels 8-16, 1.3-2 cm. Fruit 10 by 6 mm., obovate, glabrous, brown, dorsal and intermediate ridges not prominent, wing broad having a narrow median vitta; vittae about half as long as the fruit, subclavate below; commissure evittate.

Distribution: Nepal and Sikkim.

The root is said to be tonic and aphrodisiac.

ZOSIMIA Hoffm.

A perennial herb, pubescent or hirsute. Leaves 2-4-pinnate, segments small. Umbels compound, rays numerous; bracts and

bracteoles usually many, small. Calyx-teeth linear, somewhat prominent. Petals obovate, emarginate, white or yellowish, often unequal sometimes radiant. Fruit elliptic or orbicular, dorsally compressed, complanate; dorsal and intermediate ridges filiform or obscure, lateral hyaline, with a thick corky obtuse wing; furrows with solitary large vittae; carpophore 2-partite. Seed 4-6 times broader than thick.—Species 6.—W. Asia.

The genus is therapeutically inert.

1. **Zosimia orientalis** Hoffm. Gen. Pl. Umbel. ed. 1 (1814) 148.—*Z. absinthifolia* DC. Prodr. IV (1830) 195.

A stout perennial pubescent or hirsute herb 30-90 cm. high; root large, fusiform; stems grooved, pubescent. Leaves reaching 20 cm. long, decompound, oblong-lanceolate in outline, pubescent, much cut; ultimate segments narrow, linear, obtuse or subacute, 0.85-1.25 mm. broad. Flowers greenish yellow; petals obovate-oblong, 2.5-3 mm. long with a very long inflexed acumen. Primary umbels 10-30-rayed, the rays unequal, 5-10 cm. long, stout, pubescent; bracts about 10, linear-lanceolate, very acute, 1 cm. long, pubescent (often araneously so when young). Partial umbels 8-25-rayed; bracteoles 8-12, linear-lanceolate, 6 mm. long, pubescent; pedicels 3-10 mm. long. Disk very large. Ovary densely pubescent; style bases not dilated. Fruit pubescent until fully ripe, obovate or elliptic 1.3 by 1 cm. with a broad wing; dorsal and intermediate ridges prominent, very slender; vittae thick, solitary in the furrows; commissural vittae 2-4.

Distribution: Sind, Baluchistan, Punjab.—Afghanistan.

At Kharan in Baluchistan, the plant is considered a cure for cough and bowel disorders (Hughes-Buller).

Kharan: Gwatk—.

CORIANDRUM (Tourn.) Linn.

Glabrous annuals. Leaves decompound. Umbels compound, rays few; bracts 0, or small and linear; bracteoles few, filiform. Calyx-teeth small, acute, often unequal. Petals obovate, emarginate,

white or purplish, those of the outer flowers unequal, often radiant. Fruit subglobose; ridges not prominent; vittae obscure, solitary, under the secondary ridges; carpels slightly concave on the inner face, commissure distinctly 2-vittate, corpophore 2-partite. Seed convex-concave, about thrice as broad as thick.—Species 3.—Mediterranean.

C. sativum Linn. is used medicinally in Europe, China and Indo China.

OFFICIAL:—The fruit of *C. sativum* Linn. (Austria,, Belgium, Denmark, France, Great Britain, Holland, Hungary, Norway, Portugal, Spain, Turkey, United States).

1. **Coriandrum sativum** Linn. Sp. Pl. (1753) 256; Roxb. Fl. Ind. II (1832) 94.—PLATE 485C.

An annual plant, 40-50 cm. high, or sometimes somewhat more, glabrous. Leaves of two kinds, the lower ones petioled, impari-pinnatisect into 2-3 pairs of ovate-cuneiform, obtuse, incised-dentate segments, the upper ones short-petioled or subsessile, 2-3-pinnatisect into linear-setaceous lobes. Umbels 5-10-rayed, involucre 0, or composed of 1, small, setaceous bract, involucel usually of 3, short linear-lanceolate bracts.

Distribution: Wild known from Palestine, Syria, Mesopotamia and Greece.—Cultivated throughout India.

The fruit is acrid, sweet; cooling, diuretic, antipyretic, stomachic, aphrodisiac, stimulant, laxative, anthelmintic; gives appetite; cures biliousness, bronchitis, thirst, vomiting, kapha.—The whole plant exhibits the same properties; useful in dysentery (Ayurveda).

The leaves are hypnotic, analgesic; useful in hiccough, suppuration, piles, inflammation, pain in the eyes, gleet, jaundice, stomatitis, tooth-ache, bleeding of the gums, thirst, scabies, and tuberculous glands.—The seed is hot; aphrodisiac, tonic to the brain, the heart, the liver; prevents coryza and bronchitis; used in syphilis, dyspepsia, headache, biliousness; applied to ulcers on the penis (Yunani).

In native practice, it is used as a carminative, refrigerant, diuretic, tonic and aphrodisiac. The dried fruit and the volatile oil are used

as an aromatic stimulant in colic. The seeds are chewed to correct foul breath.

The juice of the fresh plant is used as an application to erythema caused by the application of marking-nut; the bruised plant is a cooling application in cases of headache.

Coriander fruits are used as a spice and flavouring agent in medicine throughout the East. They have carminative and corrective properties. The herb has been cultivated in England from early times for medicinal and culinary uses.

In Indo China, the fruit is considered stimulant and carminative. The roots and leaves, powdered and macerated with alcohol, are used to touch the eruptions of measles in children.

The plant is prescribed for snake-bite (Sushruta, Brihannighantaratnakara) and scorpion-sting (Sushruta); but is an antidote to neither snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kajbira, Karbijah, Kurbuzah, Kuzbarah—; *Bengal:* Dhane—; *Bhoti:* Ussu—; *Bombay:* Dhana, Dhanya, Kothamira—; *Burma:* Naunau—; *Canarese:* Havija, Kotambari—; *Catalan:* Gra xalandri, Saliandria—; *Chinese:* Hiang Ts'ai, Hou Siu, Hu Sui, Iuen Siu, Iuen Soui—; *Danish:* Koriander—; *Dutch:* Korander—; *English:* Coriander—; *Essex:* Col—; *French:* Coriandre, Petite coriandre—; *German:* Coriander, Falscher Anis, Koriander, Schwindelkorn, Stinkdill—; *Gujarat:* Konphir—; *Hebrew:* Gad—; *Hindi:* Dhania, Dhanya—; *Hungarian:* Koriander—; *Indo China:* Ho tuy, Hom phak, Hom pom, Huong thai tu, Ngo, Ngo thom, Rau mui—; *Italian:* Coriandolo, Coriandro—; *Konkani:* Kotbor, Kotbori—; *Malay:* Ketumbah—; *Malaya:* Hu sui, Yuan sui—; *Malta:* Coriander, Coriandolo, Cosbor—; *Manila:* Culantro, Ongsay—; *Marathi:* Dhanya, Khotbir, Khotmir, Kothmir—; *Mundari:* Dhania—; *Nepal:* Danga—; *Norway:* Koriander—; *Persian:* Kashmirkhuska, Kasriza, Kushniz—; *Philippines:* Cominos, Culantro—; *Polish:* Koriandrze, Koryander—; *Portuguese:* Coentro—; *Roumanian:* Pucioagna—; *Russian:* Kishnetz, Koriander—; *Sanskrit:* Ababika, Allaka, Chhatra, Dhana, Dhaneyaka, Dhanika, Dhaniyaka, Dhanya, Dhanyabija, Dhanyaka, Dhennika, Hridyagandha, Janapriya, Kunati,

useful in dyspepsia and diarrhœa. It is considered also very cooling and enters into most of the prescriptions for gonorrhœa. It is used as a lactagogue.

Cumin seeds are prescribed for snake-bite (Charaka) and scorpion-sting (Charaka, Vagbhata, Yogaratnakara, Baishajyaratnavali, Chakradatta, Bhavaprakasha); but they have no antidotal value against either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Kamuna, Ravamuna—; *Bengal:* Jira—; *Burma:* Ziya—; *Canarese:* Jirage, Jiringe—; *Catalan:* Cumi—; *Dutch:* Komyn, Kumyn—; *Egypt:* Kamun—; *English:* Cumin—; *French:* Anis âcre, Anis aigre, Anis faux, Cumin, Cumin officinal, Faux anis—; *German:* Kreuzkuemmel, Mutterkuemmel, Roemischerkuemmel—; *Greek:* Kyminon, Kyminos—; *Gujerati:* Jirautmi, Jiru—; *Hebrew:* Kamon—; *Hindi:* Zira—; *Italian:* Cimino, Cimonagero, Comino Cumino—; *Malayalam:* Jirakam—; *Malta:* Cumin, Cummin, Comino, Chemmun, Kommoon—; *Marathi:* Jiregire—; *Morocco:* Kamun—; *Persian:* Zira—; *Portuguese:* Cominhos—; *Roumanian:* Chimen—; *Russian:* Rimskiy Tmin—; *Sanskrit:* Ajaji, Ajajika, Dipaka, Dipya, Dipyaka, Dirghaka, Dirghakana, Gaurajaji, Gaurajiraka, Jarana, Jira, Jiraka, Jirana, Jirna, Kana, Kanajira, Kanavha, Magadha, Mitadipya, Mitajaji, Shuklajaji, Vahmisakha—; *Sicily:* Comino—; *Sind:* Zero—; *Sinhalese:* Duru, Sududuru—; *Spanish:* Comino—; *Syria:* Kemun—; *Tamil:* Seerugam, Shiragam—; *Telugu:* Jilakarra, Jiraka—; *Urdu:* Jirah—.

DAUCUS (Tourn.) Linn.

Annual or biennial herbs, usually hispid. Leaves 2-4-pinnate, ultimate segments narrow or small. Umbels compound, rays usually many, pinnate; bracts generally very many, bracteoles many, 3-fid, entire or 0. Calyx-teeth small or obsolete. Petals obovate, emarginate, white, outer often radiant. Fruit elliptic, terete or somewhat dorsally compressed, ridges all prominent, all or the secondary only bristly, lateral primary little developed; vittae solitary, under the secondary ridges, carpophore undivided or 2-fid. Seed ½-terete,

dorsally subcompressed, inner face plane.—Species 60.—Europe, Asia, Africa, America.

D. carota Linn. is used medicinally in Europe, China, Indo China, *D. gingidium* Linn. in Corsica and Sicily.

OFFICIAL:—The root of *D. carota* Linn. var. *sativa* De Cand. (Portugal).

1. **Daucus carota** Linn. Sp. Pl. (1753) 242.—PLATE 485B.

A biennial plant, 1-1.5 m. high or sometimes somewhat more, branching from the base, scabrous. Leaves triangular to oblong in outline, 2-3-pinnatisect into oblong-lanceolate, incised-dentate segments those of the upper leaves linear-lanceolate. Umbel with very numerous rays, at length contracted into a nest-like form; bracts of the involucre 3-fid or pinnate, of the involucel linear, white-margined, entire or 2-3-fid; petals radiating; central flower sterile, purple; fruits 4 mm. long, 3 mm. broad, including the prickles; prickles setaceous, as long as the diameter of the seed or longer with 1-3 recurved barbs.

Distribution: Probably a native of the sea-coasts of S. Europe, but of very ancient cultivation.—Cultivated in many parts of India.

The carrot is sweet, sharp, bitter; gives appetite; astringent to the bowels, antidysenteric, carminative, cardiotonic; cures leprosy, piles, pains, burning sensation, thirst, biliousness, tumours; good for inflammation, asthma, hiccough; corrects foul breath (Ayurveda).

The carrot has a sweet, good taste, slightly bitter; tonic, aphrodisiac, expectorant, diuretic, stomachic; good for the liver; used in bronchitis and chest troubles, urinary complaints; lessens griping, and inflammation of the spleen. For external use the leaves are preferable. The wild carrot is laxative (Yunani).

The seeds are considered to be a nervine tonic; boiled with honey and fermented, they produced a spirituous liquor. A decoction of the leaves and seeds is said to be used by natives as a stimulant to the uterus during parturition. The roots are made into a marmalade and considered refrigerant.

In the Punjab, the seeds are considered aphrodisiac, and given in uterine pain.

In the Konkan, a poultice of carrots and salt is used in tetter, and the seeds are eaten as an aphrodisiac.

The fruits are recommended in chronic diarrhœa. They are said to be diuretic.

A poultice made of the roots is used to correct the discharge from ill-conditioned sores. The raw rasped root is also deemed useful as a stimulating application, and is made into an ointment with lard. This is much used in burns and scalds to good effect.

The raw carrot when eaten acts as a mechanical anthelmintic.

At Khawas in Baluchistan the seeds of the wild carrot may serve as an emetic (Hughes-Buller).

A decoction of carrot is a popular remedy for jaundice in Europe. Rasped carrot is applied to burns and foul ulcers.

In Indo China, carrots are eaten raw and cooked to regulate the functions of the stomach and intestines; in combination with other drugs they are used for dysentery.

The Europeans of South Africa used a decoction of the common carrot for infantile diarrhœa.

Afghanistan: Zardak—; *Arabic:* Jazar—; *Bengal:* Gagar—; *Canarese:* Gajjari—; *Catalan:* Pastanaga—; *Chinese:* Hong Lo Pou, Hu Lo Fu—; *Dutch:* Karote, Peen, Vogelnest—; *English:* Bee's Nest, Bird's Nest, Carrot, Dauke—; *French:* Carotte, Rachine jaune—; *German:* Carotte, Gelbe Ruebe, Gemeine Mohre, Karotte, Moehre, Mohrruebe, Moorruebe, Mure, Voegleinimnest, Vogelnest, Wurzel—; *Greek:* Dayki, Daykos—; *Gujarat:* Gajar—; *Hindi:* Gagar, Gajar, Gajra—; *Hova:* Karaoty—; *Hungarian:* Sargarepa—; *Indo China:* Ca rot, Ho la bac—; *Italian:* Capo bianco, Carota, Carota selvatica, Dauco—; *Kashmir:* Bulmuj, Kach, Mormuj—; *Languedoc:* Pastenarga, Pastenargo—; *La Reunion:* Carotte marronne—; *Malta:* Carrot, Carota, Carota selvatica, Gallinacci, Zunnaria, Zunnaria selvagga, Carrotti—; *Marathi:* Gazara—; *Mundari:* Gajara—; *Persian:* Gazar, Zardaka—; *Polish:* Marchew—; *Portuguese:* Cenoura—; *Punjab:* Gajar—; *Roumanian:* Morcov—; *Russian:* Morkov—; *Sadani:* Gajra—; *Sanskrit:* Dindiramodaka, Gajara, Gajida, Granthimula, Grinjana, Kanda, Naranga, Narangavarna, Pindamula,

Pindika, Pitakanda, Pitamulaka, Shikhakanda, Shikhimula, Sumulaka, Supita, Svadumula, Varttula, Yavaneshta—; *Sind:* Petaigagar—; *Spanish:* Zanahoria—; *Swedish:* Morot—; *Tamil:* Gajjarakkilangu, Karttukkilangu, Manjalmullangi—; *Telugu:* Gajjaragedda, Pachchamullangi, Pitakanda, Shikhamulamu—; *Urdu:* Gazar—.

PSAMMOGETON Edgew.

A small annual, pubescent or glabrous. Leaves 1-2-pinnate, pinnae laciniate. Umbels compound; bracts and bracteoles many, small, lanceolate or linear, scarious. Calyx-teeth obsolete. Petals obovate, emarginate, white or purplish, not or but slightly radiant in the outer flowers. Fruit small, ovoid or lanceolate commissure slightly constricted; primary and secondary ridges hairy, elevated, scarcely winged, secondary rather the more prominent; vittae solitary, under the secondary ridges; carpophore 2-fid. Seed somewhat dorsally compressed, inner face plane or scarcely concave.—Species 4. W. Asia.

The genus exhibits stimulant properties.

1. **Psammogeton biternatum** Edgew. in Trans. Linn. Soc. XX, 57.

Stem 5-20 cm., divaricately branched, pubescent or grey subtomentose, not villous. Segments of the lower leaves ovate pinnatifid into narrow lobes, of the upper narrowly cuneate laciniate. Peduncles 2.5-7.5 cm., stout, lateral and terminal. Bracts 3-8, 6-13 mm., narrowly lanceolate or linear; rays 5-10, 1.3-2.5 cm.; bracteoles 4-8, 6 mm., lanceolate, sheathing the young umbellule; pedicels 6-16, 6 mm. Fruit scarcely 3 mm., lanceolate, hairs on the ridges white, capitellate, 1-seriate, scattered, longer than the carpel is broad; styles very long.

Distribution: Punjab Plain up to 3,000 ft., Sind, Baluchistan.—Afghanistan, Persia.

The plant is used as a stomachic in Sind.
Kharan: Izbothk—; *Pushtu:* Gargira—.

ARALIACEAE.

Trees or shrubs sometimes climbing (very rarely herbs), glabrous or stellately pubescent or tomentose. Leaves alternate (rarely opposite), compound or decompound (rarely simple); petioles long; stipules within and partly adnate to the petiole (rarely free or 0). Flowers regular, hermaphrodite or polygamous, in umbels, racemes, or panicled heads (rarely solitary), with bracts and bracteoles; pedicels continuous with the base of the calyx, or there articulated. Calyx-tube adnate to the ovary; limb annular or shortly cup-shaped, truncate or more or less obscurely toothed or obsolete. Petals usually 5 (rarely 6 or 7), valvate or slightly imbricate, singly or calyptrately deciduous, rarely persistent. Stamens as many as the petals (rarely more), alternate with the petals and inserted with them within the margin of the calyx around an epigynous disk. Ovary inferior, 1-many-celled; ovules solitary in each cell, pendulous, anatropous; styles as many as the cells of the ovary, distinct or united, erect or recurved. Fruit usually drupaceous or dry, with as many cells and seeds as the ovary. Seed pendulous; albumen copious, uniform or ruminate; embryo next the hilum; radicle superior.—Genera 55. Species 700.—Chiefly tropical, especially Indo-Malayan, tropical America.

1. Petals imbricated. Pedicels jointed
   Styles 2-5, free. Leaves compound........................ ARALIA.
2. Petals valvate, albumen uniform
   Ovary 2-celled. Pedicels jointed. Leaves decompound ...... NOTHOPANAX.
3. Petals valvate. Albumen ruminated
   Ovary 5-4-celled. Styles combined
   Leaves simple, lobed or pinnate. Pedicels continuous .... HEDERA.

In General they are aromatic and stimulant; the fruit of some is bitter and astringent.

Glucosides—fatsin, α-hederin—have been isolated from some of the members.

OFFICIAL:—*Panax quinquefolius* Linn.=*Aureliana Canadensis* Lafiteau (Portugal).

Aralia Tourn.

Herbs shrubs or small trees, often prickly. Leaves alternate or whorled, digitate pinnate or compound-pinnate; stipules small. Flowers often polygamo-dioecious; pedicels often jointed close under the flower. Calyx truncate or 5-lobed. Petals and stamens 5. Ovary 2-5-celled; styles 2-5, free or shortly connate at the base. Fruit 4-5-celled and -angled or subglobose and 2-3-celled.—Species 35.—N. hemisphere.

The root is diaphoretic, alterative, and tonic.

The following species are used medicinally in China and Indo China—*A. cordata* Thunb., *A. spinosa* Linn.—; in the Dutch Indies —*A. montana* Bl.—; in North America—*A. hispida* Vent., *A. nudicaulis* Linn., *A. racemosa* Linn., *A. spinosa* Linn.—.

1. **Aralia pseudo-ginseng** Benth. in Benth. & Hook. f. Gen. Pl. I, 936.—*Panax Pseudo-ginseng* Wall. Pl. As Rar. t. 137.—Plate 486A.

Rootstock horizontal, tuberous or tuberiferous. Stem 15-38 cm., erect, smooth, terminated by a whorl of leaves; the scale at its base deciduous or persistent. Leaflets 5 rarely 3, 5-15 by 1.3-3.2 cm., acuminate often caudate, rounded or tapering at the base, closely serrate or deeply doubly serrate, glabrous except the scattered bristles, especially on the upper surface, petiole 2.5-15 cm., glabrous; petiolules 0.2-5 cm. Peduncles shorter or longer than the leaves, glabrous or nearly so, solitary or 2-4, simple or with 2-5 umbellate heads; pedicels 6-25 mm., pubescent or puberulous; bracteoles 6. mm, narrow lanceolate-linear. Flowers polygamo-monoecious; styles in the male flowers sometimes united nearly to their summit. Fruit red, or half-black half-red.

Distribution: Nepal, Sikkim and Bhutan, 6,000—12,000 ft., Khasia Hills, 5,000 ft.

Ginseng enjoys in its native country the reputation of a panacea, and especially of being aphrodisiac. The affections, for the cure of which it is most esteemed, are such as are usually treated by aromatic stimulants, including dyspepsia, vomiting, and nervous

affections. It is used as a masticatory and also in infusion, and is occasionally brought to India by the Chinese.

It is used as an expectorant and antipyretic.

Marathi: Tapamari—.

NOTHOPANAX Miq.

Glabrous unarmed shrubs with alternate, simple, pinnate, or pinnately decompound leaves. Flowers small, polygamous, in panicled umbels, 5-merous. Calyx-tube obconical, the limb with 5 minute teeth. Petals 5, valvate, triangular-ovate, base broad. Stamens 5, inserted with the petals and alternate with them. Ovary inferior 2- or 3-celled; styles 2 or 3, very short. Fruit somewhat drupelike, compressed or 3-angled.—Species 12.—S. hemisphere.

The genus exhibits astringent properties.

1. **Nothopanax fruticosum** Miq. Fl. Ind. Bat. I, I, 765.—*Panax fruticosum* Linn. Sp. Pl. ed. 2, 1513.

An erect shrub 1-2.5 m. high, the leaves up to 30 cm. long, decompound, 3-pinnate, the pinnae 6-10, shorter upward, the leaflets and ultimate segments very diverse in form, mostly lanceolate, acuminate, sharply and irregularly spinulose-toothed, often lobed, 5-10 cm. long, the terminal segments usually larger than the others and more often lobed. Inflorescence terminal and in the upper axils, up to 15 cm. long, many-flowered. Flowers umbellate, shortly pedicelled. Fruits compressed, very broadly ovoid, about 4 cm. long.

Distribution: Throughout the warmer parts of India, cultivated.—Malaya and Polynesia, cultivated. Wild state unknown.

The plant is astringent. It is used in fevers.

HEDERA Tourn. ex Linn.

Climbing shrubs or small trees. Leaves simple or lobed, glabrous, exstipulate. Flowers polygamous in panicled umbels. Pedicels not or very obscurely jointed. Calyx-margin 5-toothed or subentire. Petals 5, valvate. Stamens 5. Ovary 5-celled; styles connate. Fruit globose.—Species 5.—Temperate regions of Old World.

H. helix Linn. is used medicinally in Europe, China, Indo China, and South Africa.

1. **Hedera helix** Linn. Sp. Pl. (1753) 202.—Plate 486B.

An evergreen climber with stems up to 7.5-12.5 cm. diam. and 12 m. high, climbing by means of adventitious roots which are often so numerous towards the base as to completely conceal the stem. Bark fairly smooth, pale brown, lenticellate. Blaze 3.8-6 mm., very shortly fibrous, pale yellow. Leaves alternate, very variable; on flowering shoots 5-10 cm. long, usually not lobed, very variable in breadth, base usually narrowed; on sterile shoots usually with 1-5 pairs of lobes and usually cordate bases; all coriaceous, glabrous. Petioles slender, 1.3-12.5 cm. long. Flowers 6-10 mm. diam., polygamous, green, in globose pedunculate umbels; umbels terminal, solitary or 2-6 in corymbs; peduncles and pedicels clothed with minute stellate hairs. Pedicels 5-10 mm. long. Petals triangular with a raised ridge down the centre on the inside, soon recurved. Berry 7.5 mm. diam., globose, greenish yellow or orange-yellow, with fleshy exocarp.

Distribution: Throughout the Himalaya, 6,000—10,000 ft., Khasia Hills, 4,000—6,000 ft., grows in some places.—From W. Europe to Japan.

The dry leaves are used to stimulate sores, and the berries to purge (Irvine).

The leaves and berries are stimulating, diaphoretic, cathartic. Externally the leaves are employed in Europe as poultices or fomentations in glandular enlargements, indolent ulcers, abscesses, etc. The berries are found of use in febrile disorders.

In England, Ivy gum is considered antispasmodic, and useful to women. An infusion of the berries is given for rheumatism, and a decoction of the leaves is applied externally to destroy vermin in the heads of children.

Europeans in South Africa apply the leaf, steeped in vinegar, to corns and cancerous growths.

A glucoside, *helixin,* has been extracted from the berries, and it is to the presence of this substance that their bitter-sweet, quinine-like taste is due.

Beas: Brumbrumdakari—; *Behar:* Lablab—; *Catalan:* Eura—; *Chenab:* Kurol—; *Chinese:* Ch'ang Ch'un T'eng—; *Danish:* Vedbende—; *Dutch:* Klimop, Klyf—; *English:* Barren Ivy, Benewith-tree, Bentwood, Bindwood, Black Ivy, Common Ivy, Creeping Ivy, Eevy, Ground Ivy, Hyven, Ivin, Ivory, Ivy, Small Ivy, Wood-bind—; *French:* Aise, Bourreau des arbres, Euné, Eurré, Lierée, Lierre, Lierre en arbre, Lierre à cautĕre, Lierre commun, Lierre grimpant, Lierre d'Europe, Lierre des poĕtes—; *German:* Epheu, Immergruen, Wintergruen—; *Greek:* Kossos—; *Hazara:* Arbambal—; *Hungarian:* Borostyan, Fai-borostyan—; *Indo China:* Bach cuoc ngo cong—; *Irish:* Eibhean—; *Italian:* Edera, Ellera—; *Jaunsar:* Mithiari—; *Jhelum:* Arbambal, Halbambar—; *Kashmir:* Karmora, Mandia—; *Kumaon:* Banda—; *Languedoc:* Leouno—; *Malayalam:* Maravala—; *Malta:* Edera, Ellera, Ivy, Liedna—; *Nepal:* Dudela—; *Polish:* Bluszcz—; *Portuguese:* Hera—; *Pushtu:* Parwata—; *Ravi:* Karur, Kuri—; *Roumanian:* Iedere—; *Russian:* Pliusch—; *Spanish:* Yedra, Yedra comun—; *Sutlej:* Kadloli, Kaneri, Kaniuri, Karbaru—; *Swedish:* Murgroen—; *Tamil:* Maravalai—.

ALANGIACEAE.

Trees or shrubs, sometimes spiny. Leaves alternate, simple; stipules 0. Flowers hermaphrodite, in axillary cymes; pedicels articulated. Calyx truncate or with 4-10 teeth. Petals 4-10, mostly linear, valvate, at length recurved, sometimes coherent at the base. Stamens the same number as and alternate with the petals or 2-4 times as many, free or slightly connate at the base, more or less villous inside; anthers 2-celled, linear, opening lengthwise. Disk cushion-like. Ovary inferior, 1-2-celled; style simple, clavate or 2-3-lobed; ovule solitary, pendulous, with 2 integuments. Fruit a drupe crowned by the sepals and disk, 1-seeded. Seeds with the embryo about equal to the endosperm.—Genus 1. Species 22.—Palaeotropics.

ALANGIUM Lam.

Shrubs or small trees, armed or not. Leaves alternate, petiolate, oblong, quite entire, 3-nerved from the base, persistent, Flowers white, subsilky, hermaphrodite, in axillary fascicles, ebracteate, shortly pedicelled, articulated with the pedicel. Calyx-tube turbinate, often sulcate; limb large, 5-10-toothed or truncate. Petals 5-10, linear-oblong, at length reflexed or revolute, valvate. Stamens usually 2-4 times as many as the petals; filaments filiform or flattened, more or less villous; anthers long. Disk cushion-shaped, depressed in the centre, lobed or crenulate. Ovary 1-celled; ovule solitary in each cell, pendulous; style narrowly clavate or filiform; stigma clavate or capitate, 4-many-fid or many-lobed, the lobes conduplicate. Berry crowned with the calyx-limb. Seed oblong; testa thin; albumen usually fleshy; cotyledons foliaceous; radicle elongate, cylindric, thick.—Species 22.—Asia and tropical Africa.

A. lamarckii is used medicinally in Indo China and the Philippine Islands.

1. **Alangium lamarkii** Thw. Enum (1859) 133.—PLATE 487A.

A small tree with more or less spinescent branches; bark light coloured; young parts pubescent. Leaves variable 7.5-12.5 by 2.5-5.7 cm., narrowly oblong or ovate-lanceolate, more or less acuminate, subobtuse, entire, glabrous above, pubescent on the nerves and prominently reticulately veined beneath, base rounded or acute; petioles 6-13 mm. long, densely pubescent. Flowers few, in axillary fascicles; pedicels 3-6 mm. long, densely pubescent, jointed at the top. Calyx turbinate 3 mm. long, densely silky pubescent; teeth triangular, 0.85 mm. long. Petals 5-10 (usually 6), densely pubescent outside, 1.3-2 cm. long and about 5 mm. wide, narrowly linear, reflexed. Stamens numerous (usually more than 20), nearly as long as the petals; filaments hairy at base. Style as long as the stamens; stigma very large. Fruit when young ovoid or ellipsoid, becoming nearly globular when ripe 1.3-2 cm. diam., crowned by the persistent calyx-limb, finely pubescent, not or obscurely ribbed, purplish red;

endocarp bony; albumen fleshy outside, friable inside, not at all ruminate; cotyledons foliaceous, flat, not crumpled.

Distribution: Throughout India, Ceylon.—S. China, Malaya, Philippines.

The root is acrid, bitter, slightly pungent, oily, sharp; heating, anthelmintic, alterative; cures erysipelas, biliousness, inflammations, snake-bites, and fish-poison. The juice is emetic, alexipharmic; cures "kapha", "vata", pain, inflammations, biliousness, diseases of the blood, erysipelas, hydrophobia, rat-bite, lumbago, dysentery, diarrhœa, anthelmintic.—The seeds have taste and flavour; cooling, aphrodisiac, indigestible, tonic, laxative; cure burning sensations, consumption, biliousness, erysipelas; cause "kapha", loss of appetite (Ayurveda).

The root bark is used in piles.—The stem is good in vomiting and diarrhœa.—The fruit is sweet; laxative, expectorant, carminative, anthelmintic, alexiteric; useful in inflammation, diseases of the blood, burning of the body, wasting diseases, spermatorrhœa, gleet, acute fever, lumbago (Yunani).

In native practice, the root-bark is used as anthelmintic and purgative. In Bombay, the leaves are used as a poultice to relieve rheumatic pains.

It has proved itself an efficient and safe emetic in doses of fifty grains; in smaller doses it is nauseant and febrifuge. The bark is very bitter, and its repute in skin diseases is not without foundation. It is a good substitute for Ipecacuanha, and proves useful in all diseases in which the latter is indicated except dysentery. As a diaphoretic and antipyretic, it has been found useful in relieving pyrexia. Doses as a nauseant, diuretic and febrifuge: 6 to 10 grains of the root bark; as an alterative: 2 to 5 grains; it is given in leprosy and syphilis; the natives consider it to be alexiteric, especially in cases of bites from rabid animals (Moodeen Sheriff).

The Mundas of Chota Nagpur use the root as a purgative in dyspepsia and in gout.

In the Salem District, 40 grains of the powdered bark is made into a bolus and given in cases of cobra poisoning. Both the bark

and the root are prescribed as antidotes to snake-venom (Charaka, Sharangdharasamhita, Bhavaprakasha).

The root and the bark are equally useless in the symptomatic treatment of snake-bite (Mhaskar and Caius).

Bengal: Akarkanta, Angkula, Angkura, Ankoda, Baghankura, Dhalakura—; *Bhil:* Akaya—; *Bombay:* Ankola, Kalaakola—; *Canarese:* Ankola, Ankotha, Ansroli, Asroli, Guddadagoni, Kallumavu, Lucki—; *Ceylon:* Mulanninchil—; *Godavari:* Udiyachettu—; *Gond:* Ankola, Uru—; *Gujerati:* Ankola, Ankoli,, Ankolya, Onkla—; *Hasada:* Angkoardaru—; *Hindi:* Akhaul, Akol, Akola, Anedhera, Ankora, Dhera, Kweli, Thailaankul—; *Indo China:* Choi moi—; *Khond:* Akori—; *Kolami:* Ankol—; *Lambadi:* Ankolare—; *Malayalam:* Alinnil, Ankolam, Chem, Karankolam, Kimri, Valittonti—; *Marathi:* Ankol, Ankoli, Ankul—; *Naguri:* Angkoldaru—; *Porebunder:* Ankola, Ankoli—; *Ramnagar:* Kuilu—; *Saharanpur:* Bismar—; *Sanskrit:* Ankola, Ankolaka, Ankota, Ankotaka, Ankotha, Bodha, Bhushita, Dirghakila, Dirghakilaka, Dridhakantaka, Gandhapyshpa, Ghalanta, Gudhapatra, Gudhavallika, Gunadhyaka, Guptasneha, Itikolam, Kankarola, Kathora, Kolaka, Kothara, Lambakarna, Madana, Nedishta, Nikochaka, Nikothaka, Pita, Pitasara, Ramatha, Rechi, Rochana, Sodana, Tamraphala, Vamaka, Vishaghna, Vishalatailagarbha—; *Santal:* Dela—; *Saora:* Uga—; *Sinhalese:* Eepatta—; *Tagalog:* Malatapay—; *Tamil:* Adigolam, Alangi, Alinjil, An, Angolam, Angolavayirravan, Arulavam, Attigolam, Eginam, Eralinjil, Karikkolam, Karuppuvalinjil, Oru, Sem—; *Telugu:* Ankolamu, Nallankolamu, Nalluduga, Uduga, Uru—; *Tulu:* Ankoleda—; *Urdu:* Ankola—; *Uriya:* Ankulo, Baghonokhiya, Dolanku, Konkonolo—.

CAPRIFOLIACEAE.

Small trees or shrubs, erect or climbing. Leaves opposite, rarely ternate; stipules usually wanting. Flowers hermaphrodite,

regular or irregular, in cymes or panicles. Calyx adnate to the ovary; lobes 3-5, imbricate. Petals connate in a tubular, funnel-shaped or rotate corolla, 5-fid, with imbricate lobes. Stamens 5, rarely 4, inserted on the corolla-tube alternately with the lobes. Ovary inferior 2-8- (rarely 1-) celled; style usually simple; ovules solitary. Fruit a drupe with 1-8 cartilaginous pyrenes or a many-seeded berry.—Genera 18. Species 275.—Temperate, chiefly Northern, and tropical mountains.

A. Corolla regular. Style short, 2-5-lobed. Ovary-cells 1-ovuled
  1. Leaves pinnate, leaflets 5-9, serrate .... SAMBUCUS.
  2. Leaves undivided .... VIBURNUM.
B. Corolla-limb regular or irregular. Style long. Stigma capitate
  Leaves entire. Flowers paired. Berry 2-3-celled .... LONICERA.

Bark astringent or purging; leaves astringent; flowers mucilaginous stimulant, and diaphoretic; fruits laxative, emetic, and diaphoretic.

The following are among the products isolated:—(1) acids—acetic, citric, malic, oxalic, tartaric, valeric—; (2) glucosides—sambunigrin—; (3) alkaloids—loturidine—.

OFFICIAL:—*Sambucus maderensis* Lowe (Portugal); *S. nigra* Linn. (Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Norway, Russia, Sweden, Switzerland, Turkey)=*S. vulgaris* Lamk. (Portugal).

Viburnum opulus Linn. (Russia); *V. prunifolium* Linn. (Austria, France, Great Britain, Holland, Italy, Russia, Spain, Turkey).

SAMBUCUS (Tourn.) Linn.

Shrubs or small trees. Leaves unequally pinnate, large, often stipulate; leaflets serrate or lacinate. Corymbs large, very compound, bracteate; flowers small, jointed with the pedicel, very rarely bracteolate. Calyx-limb 3-5-toothed. Corolla rotate or campanulate, 3-5-partite. Stamens 5, attached to the base of the corolla. Ovary 3-5-celled; style short, 3-5-partite, or stigmas 3-5-sessile; ovules 1 in each cell, pendulous. Drupe crowned by the calyx-teeth, 3-5-celled. Seeds compressed; embryo long.—Species 20.—N. temperate, S. America, Asia to Australia.

1. Herbaceous .... 1. *S. ebulus.*
2. A shrub .... 2. *S. javanica.*

Cathartic, excitant, and sudorific.

The following species are used medicinally in Europe—*S. ebulus* Linn., *S. nigra* Linn., *S. racemosa* Linn.—; in China—*S. javanica* Reinw., *S. racemosa* Linn.—; in Indo China—*S. javanica* Reinw. *S. nigra* Linn., *S. racemosa* Linn.—; in North America—*S. canadensis* Linn., *S. nigra* Linn.—; in California—*S. caerulea* Rufin—; in Brazil—*S. australis* Cham. & Schlecht.—.

OFFICIAL:—The flowers and fruits of *S. maderensis* Lowe (Portugal), *S. nigra* Linn. (Italy)=*S. vulgaris* Lamk. (Portugal).

The flowers of *S. nigra* Linn. (Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Norway, Russia, Sweden, Switzerland, Turkey).

1. **Sambucus ebulus** Linn. Sp. Pl. (1753) 269.—PLATE 487B.

Large herbaceous stems 0.9-1.8 m. high, from perennial rootstock, glabrous; leaflets 3-5 pairs, shortly stalked, oblong-lanceolate, sharply and closely serrate. Stipules foliaceous, often pinnate. Flowers in a large, sessile or pedunculate, compact corymbose cyme 10-15 cm. across. Corolla-limb concave.

Distribution: Upper Chenab and Jhelum, 4,000—11,000 ft.—Europe, N. Africa, W. Asia.

The roots have purgative properties, and are used in dropsy, as also the berries (Honigberger).

The leaves are expectorant, diuretic, diaphoretic, purgative. They are said to be very efficacious in dropsy, and used in many parts of Europe.

In England, the root is still used in dropsy. A decoction made from it, as well as from the inner bark, purges and promotes free urination. The leaves made into a poultice is applied to swellings and contusions. The rob is actively purgative.

Catalan: Ebuls—; *Chenab:* Gandal, Gandala—; *Danish:* Attik, Sommerhyld—; *Dutch:* Haddig, Laaga, Vlier—; *English:* Danesweed, Danewort, Danseblood, Dwarf Elder, Walewort—; *French:*

Eble, Eousses, Euble, Hiĕble, Ièble, Sahuc, Petit sureau, Sureau en herbe, Sureau hiĕble, Yĕble—; *German:* Ackerflieder, Adachbeere, Adenbeere, Ahlhorn, Aktelnbeere, Attich, Haddich, Heilandbeere, Kinkelbeere, Krauthollunder, Niederflieder, Otschbeere, Schetschken, Schieweken, Schiewiken, Schilbken, Zwerghollunder—; *Greek:* Chamaiakti—; *Hungarian:* Foldi-bodza—; *Italian:* Colore, Ebbio, Ebulo, Geolo, Nibbio—; *Kikuyu:* Mukomboki—; *Malta:* Dwarf Elder, Colore, Ebbio, Ebbiolo, Sebuka salvagga—; *Polish:* Chebd—; *Portuguese:* Ebulo—; *Punjab:* Gandal, Ganhula, Gwandish, Mush-kiara, Richhkas, Siske, Tasar—; *Roumanian:* Boz, Bozie—; *Russian:* Dikaya buzina—; *Spanish:* Sauquillo, Yezgo—; *Swedish:* Sommarhyll—.

2. **Sambucus javanica** Reinw. ex Blume, Bijdr. 657.

A straggling shrub. Leaves 45 cm., of 5-9 oblong-lanceolate leaflets free 7.5-20 cm., puberulous or nearly glabrous; stipules usually small or 0. Corymbs usually leafy at the base, often 30 cm. diam., puberulous or almost villous; bracteoles minute, ovate. Corolla 4 mm. diam., broadly campanulate, white or pink. Berry 3-4 mm. diam., globose. Drupes black.

Distribution: Assam & E. Bengal Plain, Sikkim up to 6,000 ft.—Java, China, Japan.

In Indo China, the plant is used as a depurative, diuretic, and purgative.

Indo China: Cha lang thao, Com chay, Soc dich—; *Philippines:* Hagonoysabuquid, Sauco—.

Viburnum Linn.

Trees or shrubs. Leaves opposite, simple or lobed; stipules inconspicuous or 0. Flowers in terminal or subterminal umbels, corymbs or panicles. Calyx-tube turbinate or cylindric; lobes 5. Corolla-lobes 5. Stamens 5, inserted on the corolla-tube. Ovary 1-3-celled; ovules 1 in each cell; stigma 3-lobed. Fruit a dry or fleshy drupe, usually 1-seeded; endocarp crustaceous, ridged and furrowed or excavated on one side.—Species 110.—Tropical and sub-tropical, especially Asia and America.

The leaves are astringent. The flowers are diuretic and diaphoretic. The berries are antiscorbutic.

The following are used medicinally in Europe—*V. lantana* Linn., *V. opulus* Linn., *V. tinus* Linn.—; in China—*V. dilatatum* Thunb.—; in Indo China—*V. dilatatum* Thunb., *V. opulus* Linn., *V. sieboldi* Miq., *V. tomentosum* Thunb.—; in the United States of America—*V. lentago* Linn., *V. obovatum* Ruiz & Pav., *V.* opulus Linn., *V. prunifolium* Linn.—.

Official:—The stem bark of *V. opulus* Linn. (Russia), *V. prunifolium* Linn. (Austria, France, Great Britain, Holland, Italy, Russia, Spain, Turkey).

1. **Viburnum foetidum** Wall. Pl. As. Rar. I, 49, t. 61.—Plate 488A.

A shrub, 1.8-3 m. high, the young shoots covered with a stellate scurfy pubescence. Leaves elliptically oblong to oblong, cuneate at the 3-nerved base, on a rather short stellately pubescent petiole, blunt, acute or acuminate, coarsely sinuate-toothed, serrate or sometimes quite entire, 2.5-10 cm. long, stellately pubescent above along the midrib and beneath all over, more or less scurfy along the midrib and in nerve axils. Flowers small, bracteoled, forming a compound umbelled, densely twany-stellate and somewhat scurfy-pubescent cyme on a 2.5-5 cm. long terminal peduncle, nude or involucred with 1-4 small bract-like floral leaves; calyx-lobes broadly ovate; corolla glabrous, rotate, with a short tube; style short, broadly conical; ovary glabrous. Berries compressed-ovate, acute, the size of a pepper-kernel, glossy.

Distribution: Khasia Mts. and Assam, 3,000—5,000 ft., N. Burma.

It is acrid, bitter and astringent, and used as an emmenagogue.

A wine-glassful of the juice of the leaves is administered internally in menorrhagia daily, also in post-partum hæmorrhage.

Bombay: Narvel—.

Lonicera Linn.

Erect or climbing shrubs. Leaves opposite, bases sometimes connate, entire or sometimes sinuate; stipules 0. Flowers usually in

peduncled pairs, axillary and soliary or in subterminal heads panicels or clusters; bracteoles 2. Calyx-tube ovoid or globose; limb 5-toothed. Corolla often gibbous at the base, limb 5-cleft, regular or nearly so, or 2-lipped, the upper lip erect, 4-toothed, the lower reflexed, entire. Stamens 5, inserted on the corolla-tube. Ovary 2-3-celled; ovules several in each cell; stigma capitate. Fruit a berry, berries distinct or united in pairs.—Species 100.—N. hemisphere.

The fruit is emetic and cathartic.

The following are used medicinally in Europe—*L. alpigena* Linn., *L. caprifolium* Linn., *L. periclymenum* Linn., *L. tatarica* Linn., *L. xylosteum* Linn.—; in China: *L. japonica* Thunb.—; in Indo China —*L. glauca* Hook., *L. gracilipes* Miq., *L. japonica* Thunb.—; in Malaya—*L. japonica* Thunb.—.

1. **Lonicera glauca** Hook. f. & Th. in Journ. Linn. Soc. II, 166 (non Meerb.).—PLATE 488B.

A dwarf deciduous shrub with slender spreading erect or decumbent stems 15-23 cm. high and up to 1.3 cm. diam. Bark loose, fibrous, brown. Young shoots pink or pinkish purple, minutely pubescent or sometimes glabrous. Leaves 7.5-20 by 3.8-7.5 mm., oblong or oblong-lanceolate, obtuse or acute with a few stout minute hairs on both surfaces especially on the under-surface and margin or glabrous except the margin, glaucous. Petioles less than 2.5 mm. long, bases connate in pairs, glabrous in pairs, glabrous or pubescent. Bracts 5-7.5 mm. long, ovate, flat, ciliolate. Bracteoles 0. Peduncle very short. Corolla 1.6-2.5 cm. long, yellow, the tube slender, glabrous, gibbous at the base, slightly widening near the top with rounded lobes. Berries confluent or not 6-10 mm. long, ovoid or ellipsoid, capped with the persistent calyx, deep orange colour glabrous.

Distribution: N.-W. Himalaya, 12,000—16,000 ft., Garhwal, Kumaon.

In Indo China, the leaves and the flowers are considered an excellent remedy in the treatment of venereal diseases.

Hindi: Shea, Sheva, Shingtik—; *Indo China:* Lao ngan hoa—; *Punjab:* Shea, Sheva, Shingtik—;

RUBIACEAE.

Trees, shrubs or herbs, erect, prostrate or climbing. Leaves opposite or whorled, entire; stipules various, inter- or intra-petiolar, very rarely 0. Flowers hermaphrodite, rarely unisexual, usually regular, the inflorescence various. Calyx-tube adnate to the ovary; limb various. Corolla regular, gamopetalous; lobes 4-5. Stamens as many as the corolla-lobes, inserted on its mouth or tube. Disk epigynous, usually annular or swollen. Ovary 2-10- (usually 2-) celled; ovules 1 or more in each cell; style simple or cleft; stigmas various. Fruit 2-10-celled, a berry drupe or capsule or of separating cocci.—Genera 450. Species 5,500.—Mostly tropical a number temperate, and a few arctic.

A. Ovules numerous in each cell

- I. Flowers collected into dense globose heads. Corolla funnel-shaped, stigma simple
  - a. Ovaries confluent. Fruits forming a globose fleshy mass. Corolla-lobes imbricate in bud
    1. Ovary 2-celled, ovules numerous .... SARCOCEPHALUS.
    2. Ovary 4-celled above, 2-celled below, ovules many .... ANTHOCEPHALUS.
  - b. Ovaries free or nearly so. Fruits free, capsular
    1. Flowers bracteolate. Calyx-limb 5-lobed. Corolla-lobes valvate .... ADINA.
    2. Flowers bracteolate. Calyx-limb entire. Corolla-lobes valvate .... MYTRAGYNA.
    3. Flowers ebracteolate. Corolla-lobes imbricate .... NAUCLEA.
    4. Flowers ebracteolate. Corolla-lobes valvate. Climbers with hooked peduncles .... UNCARIA.
- II. Corolla-lobes valvate, imbricate or twisted in bud. Fruit capsular, 2-celled. Seeds winged
  - a. Corolla-lobes valvate. Style entire. Flowers in panicled spikes. Bracts leafy .... HYMENODICTYON.
  - b. Corolla tubular, lobes valvate in bud, edge fringed with soft hairs .... CINCHONA.
- III. Corolla-lobes valvate in bud. Herbs, rarely shrubs, never trees
  - a. Fruit oblong, subglobose or orbicular; 2-, rarely 4-celled Capsule loculicidal above the remote calyx-teeth, rarely indehiscent. Seeds minute, angular .... OLDENLANDIA.
  - b. Fruit broadly didymously obcordate, of 2 compressed spreading lobes, loculicidal above the calyx
    Flowers crowded on the upper side of the branches of a peduncled cyme .... OPHIORRHIZA.

IV. Corolla-lobes valvate in bud. Fruit fleshy or drupaceous, indehiscent. Seeds minute

Flowers panicled or corymbose. Calyx with 1 lobe usually forming a coloured leaf .... MUSSAENDA.

V. Corolla-lobes twisted in bud. Fruit berried, fleshy or dry. Seeds usually large

a. Inflorescence usually axillary. Stigma fusiform. Ovary 2-celled .... RANDIA.

b. Inflorescence usually axillary. Stigma fusiform. Ovary 1-celled .... GARDENIA.

VI. Corolla-lobes valvate in bud. Stamens inserted in the mouth of the corolla

a. Ovary 2-celled. Stipules equal .... PLECTRONIA.

b. Ovary 3-5-celled. Stipules equal .... VANGUERIA.

VII. Corolla-lobes twisted in bud. Ovary 2-4-celled. Fruit a 2-4-celled berry or drupe with 2-4 free or united pyrenes

a. Flowers panicled or corymbose. Bracts coriaceous, not sheathing .... IXORA.

b. Flowers panicled or corymbose. Bracts membranous, lower sheathing .... PAVETTA.

c. Flowers axillary, fascicled or solitary .... COFFEA.

VIII. Corolla-lobes valvate in bud. Stamens inserted in the mouth or throat of the corolla. Fruit a 2-4-celled berry or a drupe 2-4 pyrenes

Calyx-tubes cohering in a head. Heads many-flowered, solitary or umbelled .... MORINDA.

IX. Corolla-lobes valvate in bud. Stamens inserted on the throat or base of the corolla. Fruit capsular, 5-valved or with dorsally compressed pyrenes

a. Styles 2, capillary, twisted. Pyrenes 2. Twining shrubs .. PAEDERIA.

b. Style 5-fid. Capsule 5-valved at the top. Erect shrubs ... HAMILTONIA.

X. Corolla-lobes valvate in bud. Style entire. Stigma capitate or bifid. Fruit small, dry, capsular or of 2 cocci. Herbs rarely undershrubs

a. Fruit of 2 separable cocci, both or one only dehiscing ventrally .... BORRERIA.

Fruit of 2 connate cocci. Calyx-limb greatly enlarged ...... GAILLONIA.

XI. Corolla-lobes valvate in bud. Ovary 2-celled. Style-arms 2. Herbs

Corolla rotate or shortly campanulate, 5-merous ...... RUBIA.

The root is acrid, emetic, diaphroetic, purging or diuretic. The bark is generally bitter, astringent, tonic, and febrifuge.

The Order is mostly remarkable for the number of alkaloids

which have been isolated from a few of its genera:—(i) Cinchona Group—paricine, cinchonine, cinchonicine, cinchonidine, homocinchonidine, cinchotine, cinchamidine, cinchonamine, cupreine, quinamine, conquinamine, quinine, quinidine, quinicine, hydroquinine, hydroquinidine, chairamine, conchairamine, chairamidine, conchairamidine, cusconine, concusconine, aricine, dicinchonine, diconquinine, javanine, cuscamine, cuscamidine, cusconidine—; (ii) Ipacacuanha Group—ipecamine, hydroipecamine, psychotrine, o-methylpsychotrine, emetine, cephaeline, emetamine—; (iii) Coffea Group—caffeine, trigonelline—.

Among the other substances obtained from the members of the Order may be mentioned (i) alcohols—benzyl, phenylethyl, linalool, terpineol—; (ii) esters—linalyl acetate, methyl anthranilate, methyl salicylate—; (iii) aromatic ketones—2-hydroxyanthraquinone, 1:2-dihydroxyanthraquinone, 2:3-dihydroxyanthraquinone, 1:3-dihydroxy-6-methylanthraquinone—; (iv) glucosides—aesculin, calmatambin, morindin, quinovin, ruberythric acid, rubiadin—.

OFFICIAL:—Caffeine (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States).

Cinchonidine (Portugal);—sulphate (France, United States).

Cinchonine (Portugal);—hydrochloride (Italy).

Emetine hydrochloride (Belgium, Germany, Holland, Italy, Japan, Spain, Turkey, United States).

Quinine (Holland, Portugal, Spain, Sweden);—carbonate (Holland, Italy);—chlorhydrosulphate (Spain);—ethylcarbonate (Belgium, France, Great Britain, Italy, Japan, Spain, Switzerland, United States);—ferrocitrate (Germany, Hungary, Japan, Sweden, Switzerland);—formate (France);—glycerophosphate (France);—hydrate (France, Hungary, Turkey);—hydrobromide (Belgium, France, Italy, Russia, Sweden, Switzerland, United States);—dihydrobromide (France);—hydrochloride (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States);—dihydrochloride (France, Great Britain, Italy, Russia, Spain,

United States)—; iodobismuthate (France, Spain);—salicylate (Italy, Spain);—sulphate (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States);—acid sulphate (United States);—bisulphate (Austria, France, Great Britain, Hungary, Italy, Spain, United States);—tannate (Austria, Denmark, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, Switzerland, Turkey, United States);—valerianate (France, Italy, Portugal, Spain).

Quinidine sulphate (Belgium, Great Britain, Holland, Italy, Spain, United States).

Callicocca Ipecacuanha Gomes. & Brot.=*Cephaelis Ipecacuanha* Rich. (Portugal).

Cephaelis acuminata Karsten, *C. Ipecacuanha* (Brotero) A. Richard (Great Britain, United States).

Chiococca racemosa Jacq. (Portugal).

Cinchona spp. (Austria, Denmark, Great Britain, Italy, Japan, Norway, Portugal, Spain, Sweden, United States); *C. Calisaya* Wedd. (France, Great Britain, Italy, Portugal, Spain, United States); *C. Chahuarguera* Pav. (Spain); *C. Condaminea* Humb. & Bonpl.=*C. Chahuarguera* Pavon & *C. crispa* Tafula (Portugal); *C. ledgeriana* Moens (Great Britain, Italy, United States); *C. micrantha* Ruiz & Pavon (Portugal); *C. nitida* Ruiz & Pavon (Portugal); *C. officinalis* Linn. (Great Britain, Spain); *C. robusta* Howard (Great Britain); *C. succirubra* Pav. (Austria, Belgium, France, Germany, Great Britain, Holland, Hungary, Italy, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, United States); *C. Uritusinga* Pav. (Spain); *C. Urituzinga* Pavon (Portugal).

Coffea arabica Linn. (Portugal, Spain).

Psychotria Ipecacuanha Stokes (Holland).

Rubia tinctorum var. *sativa* Linn.=*R. tinctorum* Brot. (Portugal).

Uncaria Gambier Roxb. (Holland),—(Hunter) Roxb. (Great Britain); *U. Gambir* Roxb. (Japan).

Uragoga Ipecacuanha Baillon (Austria, Denmark, Japan, Norway, Sweden),—H. Bn. (Belgium, France),—(Willdenow)

Baillon (Germany, Russia, Switzerland, Turkey),—H. Bn.= *Psychotria Ipecacuanha* Mueller, *Cephaelis Ipecacuanha* A. Rich. (Spain),—(Willdenow) Baillon=*Cephaelis Ipecacuanha* Willdenow, *Psychotria Ipecacuanha* Muller Argau (Hungary, Italy).

SARCOCEPHALUS Afzel.

Shrubs or trees. Leaves petiolate; stipules interpetiolar and caducous, or intrapetiolar and persistent. Flowers packed into globose heads, the calyx-tubes fused into a fleshy mass; peduncles simple, usually solitary, terminal, bracteate below the middle; bracts small. Calyx-lobes 4-5, persistent or caducous. Corolla-tube long, narrowly funnel-shaped, glabrous; lobes 4-5, imbricate, glabrous or pubescent. Stamens 4-5, inserted on the mouth or throat of the corolla. Ovary 2-celled; ovules numerous, imbricate, on pendulous placentæ; style filiform, exserted; stigma fusiform. Fruits combined into a fleshy globose mass of 2-celled pyrenes with very thin septa. Seeds few in each cell, not winged; testa crustaceous; albumen fleshy. —Species 10.—Palaeotropics.

1. Leaves 10-15 by 3.8-5.7 cm. .... 1. *S. missionis.*
2. Leaves 12.5-30 by 10-20 cm. .... 2. *S. cordatus.*

The genus is tonic and antipyretic.

S. cordatus Miq. and *S. officinalis* Pierre are used medicinally in Indo China, *S. esculentus* Afz. and *S. russegeri* Kotschy in Nigeria and the Gold Coast.

1. **Sarcocephalus missionis** Haviland Rev. Naucl. in Journ. Linn. Soc. 33 (1897) 32.

A small tree. Leaves 10-15 by 3.8-5.7 cm., elliptic-lanceolate, subobtuse, membranous, glabrous, shining above, running down wing-like into the petiole; main nerves 10-12 pairs, slender; petioles scarcely 13 mm. long; stipules intrapetiolar, persistent, 5 mm. long, triangular, acute, more or less connate, forming a sheath. Penduncles stout, solitary, usually inclined, 1.3-2.5 cm. long, with stipular sheathing bracts at the base and 4 small bracts 4-6 mm. long united below into a cup attached on the peduncle below its middle. Heads of flowers 2.5-3.2 cm. in diam. Calyx hairy, the calyx-tubes fused

together, 2 mm. long; calyx-lobes 3-4 mm. long, oblong, subclavate at the apex, hairy inside and outside. Corolla yellow; tube 6-8 mm. long, glabrous; lobes oblong, obtuse, hairy on both sides, 2.5 mm. long. Anthers apiculate, reaching to about the middle of the corolla-lobes. Style exserted about 5 mm. beyond the corolla-lobes; stigma fusiform. Fruits connate into a fleshy globose mass. Seeds arillate, irregularly flattened, imbricate; testa black, crustaceous.

Distribution: N. Kanara, W. Coast of Madras Presidency, in Malabar and Travancore up to 1,500 ft.

The bark, in the form of powder or decoction, is used in leprosy, ulcers, rheumatism and constipation.

Canarese: Anavu, Holehalasu—; *Malayalam:* Attuvanni—; *Tamil:* Attuvanji—.

2. **Sarcocephalus cordatus** Miq. Fl. Ind. Bat. II (1856) 133.

A small tree, bark silvery-grey, smooth, branches marked with prominent leaf-scars, young parts minutely stellate-pubescent. Leaves large, 10-20 cm., broadly ovate-oval, slightly caudate at base rounded or very obtuse at apex, entire, undulate, glabrous above, glabrous or finely pubescent beneath; petiole 2-2.5 cm., stipules 1.3-2.5 cm., obovate-rotundate, slightly connate, deciduous. Flowers very numerous, fused together by their fleshy calyx-tubes, heads 2-2.5 cm. diam., on stout peduncles; calyx-segments small, club-shaped; corolla-tube long, lobes acute; stamens included; style very long, much exserted, stigma large, clavate; head of fruit about 2.5 cm., globose, solid, fleshy. Seeds slightly rough, black.

Distribution: Malaya, Philippine Islands.

The bark is tonic and antipyretic.

Burma: Mau, Maulettanshe—; *Indo China:* Gao—; *Sinhalese:* Bakmi, Vammi—.

ANTHOCEPHALUS A. Rich.

Trees. Leaves large; stipules caducous. Flowers crowded in terminal, peduncled, globose, solitary heads. Calyx-limb with 5 well-developed lobes. Corolla-tube long, funnel-shaped; lobes 5,

imbricate. Stamens 5, on the throat of the corolla; filaments short. Ovary 4-celled above, 2-celled below; ovules very many. Style exserted; stigma fusiform. Fruit a fleshy enlarged receptacle on which the capsules are embedded, the capsules having, under the thin envelope, 4 crustaceous caps easily separable from the lower membranous part. Seeds many.—Species 3.—Indo-Malayan.

A. cadamba Miq. is used medicinally in Tongking.

1. **Anthocephalus cadamba** Miq. Fl. Ind. Bat. II, 135.—*Nauclea Cadamba* Hort. Beng. 4; Fl. Ind. I (1832) 512.—Plate 489A.

A medium sized tree attaining 2 m. girth and 18 m. high. Branches spreading horizontally and slightly enlarged at their junction with the main stem. Bark dark brown, roughish, with shallow fissures, exfoliating in small irregular woody scales. Blaze 2.2-3.3 cm., very fibrous, pale yellow rapidly truning dirty greenish brown on exposure. Leaves 15-30 by 10-17 cm., elliptic-oblong or ovate, acute or shortly acuminate, base usually rounded or subcordate and abruptly cuneate on the petiole, glabrous and dark glossy green above with paler midrib and lateral nerves, glabrous or pubescent beneath, coriaceous; secondary nerves 10-14 pairs, prominent beneath, curving upwards towards the leaf-margin, base decurrent on the midrib. Stipules 1.3-1.6 cm. long. Petiole 2.5-6.3 cm. long, terete. Flowers small, orange or yellow, in globose heads which are solitary and terminal and 2.5-4.5 cm. diam. Corolla 1.3 cm. long. Stigmas white, much exserted. Fruit a globose pseudocarp 5-6.3 cm. diam., yellow when ripe.

Distribution: From the Himalaya to Ceylon and Malacca, wild or cultivated.—Malay Islands.

The bark is pungent, bitter, sweet, acrid, saline; aphrodisiac, cooling, indigestible, galactagogue, astringent to the bowels, vulnerary, alexiteric; good in uterine complaints, blood diseases, strangury, "vata", "kapha", biliousness, burning sensation.—The fruit is heating, aphrodisiac; causes biliousness when ripe.—The

sprouts are acrid; aphrodisiac, stomachic; cure leprosy, and dysentery (Ayurveda).

The bark is used as a febrifuge and tonic.

In the Konkan, the fresh juice of the bark is applied to the heads of infants when the fontanelle sinks, and a small quantity mixed with cumin and sugar is given internally. In inflammation of the eyes, the bark juice, with equal quantities of lime juice, opium and alum, is applied round the orbit.

A decoction of the leaves is used as a gargle in cases of aphthæ and stomatitis.

In some parts of Tongking the bark is given for coughs, in some other parts for fever. The bark is generally considered tonic.

Charaka prescribes the bark in the treatment of snake-bite; but the bark is not an antidote to snake-venom (Mhaskar and Caius).

Assam: Roghu—; *Bengal:* Kadam—; *Bombay:* Kadamba, Kaddam, Nhyu—; *Burma:* Mau, Maukadun—; *Canarese:* Bale, Kadamba, Kadubale, Kaduve, Kadwal—; *Chittagong:* Bolkadam—; *Gujerati:* Kadamb—; *Hindi:* Kadam, Kadamb—; *Indo China:* Gao, Phay vi—; *Kolami:* Sanko—; *Lepcha:* Pandur—; *Magahi:* Mau, Sanyepang—; *Malayalam:* Attuttekka, Katampa, Katarvayura, Kattuchakka, Nipam, Shakka, Vellakatampa—; *Marathi:* Kadam, Kadamb, Nhiv—; *Mechi:* Kodum—; *Mundari:* Kadamdaru, Kadomdaru, Sangkodaru—; *Mysore:* Arsanatega, Heltega—; *Panch Mahals:* Kalam, Nhio, Nhiu—; *Portuguese:* Chinchona brava—; *Reddi:* Peddasoko—; *Sanskrit:* Ashokari, Dasa, Deva, Halipriya, Haridra, Haripriya, Jala, Jirnaparna, Kadamba, Kadambaryya, Karnapuraka, Lalanapriya, Mahadhya, Nadija, Nipa, Pravrishenya, Priya, Priyaka, Shatpadeshta, Sidhupushpa, Surabhi, Vrittapushpa—; *Sinhalese:* Embulbakmi, Kadamba—; *Tagalog:* Bagarilao, Bagarilat—; *Tamil:* Arattam, Indulam, Kadappai, Kadambu, Kolayilal, Vellaikkadambu—; *Telugu:* Kadambakamu, Kadambamu, Kadambe, Kadimi, Mogulukadimi, Nipamu, Nripalakadambamu, Peddakambo, Prenkhanamu, Priyakamu, Rudrakshakamba—; *Tulu:* Kadubale—; *Uriya:* Holiptiya, Kadambo, Kodombo, Kodomo, Nipo—; *Visayan:* Caluntingan—.

ADINA Salisb.

Trees or shrubs with terete branches. Leaves petiolate, ovate, lanceolate or cordate; stipules interpetiolar, large, oblong, obtuse, caducous. Flowers small, crowded in solitary panicled globose heads surrounded by paleaceous bracteoles, the calyces not fused together. Calyx-tube angled; lobes 5. Corolla-tube elongate, funnel-shaped, the throat glabrous inside; segments 5, valvate. Stamens 5, inserted on the mouth of the corolla; filaments short. Disk cup-shaped. Ovary 2-celled; ovules numerous, inserted on a pendulous placenta, imbricate; style filiform; stigma clavate, rarely capitate. Capsule of 2 dehiscent cocci, many-seeded. Seeds oblong; testa winged; nucleus small; albumen copious, fleshy; radicle superior.—Species 15.—Tropical Asia and Africa.

This genus is therapeutically inert.

1. **Adina cordifolia** Benth. & Hook. f. Gen. Pl. II (1873) 30.—*Nauclea cordifolia* Roxb. Corom. Pl. I (1795) 40, t. 53.—PLATE 490.

A large deciduous tree with the stem often irregularly fluted and buttressed at the base and commonly reaching 6 m. girth and 33 m. high. Bark partly dark grey or blackish and partly pale ashy or silvery white, rather rough, exfoliating in irregular woody scales. Blaze 2.5-3.8 cm., soft, with copious short fibre, pinkish brown but much paler towards the inside, the whole rapidly turning orange-brown on exposure, juice turning black on the blade of a knife. Leaves opposite, 10-25 cm. diam., orbicular, shortly acuminate, base cordate, glabrescent above, pubescent beneath, with 5-8 pairs of lateral nerves. Petiole 3.8-10 cm. long, stout, pubescent. Stipules 1.3-1.8 cm. long, oblong or obovate. Flowers yellow, in globose pedunculate heads 1.8-2.5 cm. diam. Peduncles axillary, 1-4 together, 2.5-10 cm. long, each bearing a solitary head (rarely more). Corolla 6 mm. long, pubescent. Capsules splitting into 2 dehiscent cocci. Seed many, minute, winged.

Distribution: From the Himalayas to Burma and through Central and S. India to Ceylon.

The bark is acrid, bitter, pungent; tonic, vulnerary, aphrodisiac; cures inflammations, biliousness, diseases of the blood, skin diseases (Ayurveda).

The juice is used to kill worms in sores.

The small buds, ground with round pepper, are sniffed into the nose in severe headache (Campbell).

In Cambodia, the root is used as an astringent in dysentery.

Among the Mundas of Chota Nagpur a decoction of the bark and of that of *Oroxylon indicum* mixed with candied sugar is given as a drink in strangury.

Assam: Kelikadam, Roghu—; *Bahraich:* Tikkoe—; *Bengal:* Bangka, Dako, Kelikadam, Petpuria—; *Burma:* Hnaubeng, Hnaw, Nhanben, Nhingpen—; *Cambodia:* Khwao—; *Canarese:* Anavu, Anigallu, Arasinatege, Arunsantige, Doddakadaga, Hedde, Heretege, Hettiga, Kadaga, Kadambe, Pachenike, Pettige, Yettagal, Yuethagada—; *Central Provinces:* Haldi, Hardu, Hardua—; *Garo:* Shangdong—; *Gond:* Hardu, Kurmi, Paspu—; *Gonda:* Tikkoe—; *Gujerati:* Aldavan, Haladaravo, Haladhwan—; *Hasada:* Kurumbadaru—; *Hindi:* Haladu, Haldava, Haldu, Haludava, Harda, Hardu, Kadami, Karam, Ladiva—; *Khond:* Mandugram—; *Kolami:* Kombasanko, Kurumba—; *Konkani:* Edu—; *Kumaon:* Haldu—; *Lambadi:* Highora—; *Magahi:* Thaing—; *Malayalam:* Barakuram, Katampa, Manjakadambu, Mannakkatampa, Pitampu—; *Marathi:* Haldarava, Haldiva, Heddi, Hedu, Honangi—; *Mysore:* Arsintega—; *Naguri:* Karamdaru—; *Nepal:* Karam—; *Portuguese India:* Aldavana—; *Sanskrit:* Bahuphala, Bhramarapriya, Bhringavallabha, Dharakadamba, Dhulikadamba, Gauradruma, Haridraka, Haridru, Haridruma, Hardra, Kadambaka, Kesharadhya, Mahakadamba, Meghabha, Nipa, Pitadaru, Pitaka, Pitakadruma, Pitakashtha, Pitavarna, Pravrishya, Priyaka, Pulaki, Shatpadapriya, Supushpa, Suravha—; *Santal:* Karam—; *Sinhalese:* Kolong—; *Tamil:* Kadambai, Manjatkadambu—; *Telugu:* Bandaru, Daduga, Kamada, Kamba, Pachabotruga, Pachaganapa, Pasupukadimi, Rudraganapa, Rudrakadapa—; *Tulu:* Anavu—; *Uriya:* Holondo, Kelikodombo—.

NAUCLEA Linn.

Peduncles undivided, terminal, single or 3 together. Flowers pentamerous, calyx-lobes narrow, deciduous, corolla-lobes imbricate in bud, ovaries not confluent. Stigma globose or broadly conical, seeds winged, the wing bifid at one end.—Species 35.—Tropical Asia, Polynesia.

The genus is tonic and febrifuge.

N. rhynchophylla Miq. and *N. sinensis* Oliver are used medicinally in China.

1. **Nauclea sessilifolia** Roxb. Fl. Ind. I (1832) 515.—*Adina sessilifolia* Hook. f. Gen. Pl. II, 30.—Plate 489B (under *Adina sessilifolia*).

A large deciduous tree. Leaves glabrous, coriaceous, nearly sessile, from a cordate base elliptic, 12.5-23 cm. long; secondary nerves distant, 6-8 pairs. Peduncles stout, mostly single, corolla-lobes appressed grey-pubescent.

Distribution: Cachar, Chittagong, Burma.—Cochin-China, Formosa.

The bark is used for bowel complaints and fever.

In Cambodia, the wood is considered depurant and tonic; an infusion or decoction is given to women during the two weeks which follow delivery. The bark is used as an astringent, tonic and styptic; it is administered in gingivitis, diarrhœa, tuberculosis with hæmoptysis, metritis and liver disorders.

Bengal: Kum—; *Burma:* Teinkala, Thitpayoung—; *Cambodia:* Roleai—; *Chakma:* Kumkoi—; *Haldwani:* Phaldu—; *Magahi:* Thaing—; *Ramnagar:* Phaldu—.

MYTRAGYNA Korth.

Shrubs or trees. Leaves petiolate, usually with transverse parallel nerves; stipules interpetiolar, large, caducous. Flowers yellow, crowded in globose axillary and terminal solitary panicled or subumbellate usually 2-bracteate heads; bracteoles paleaceous. Calyx-tube short, ovoid or obconic; limb cupular or tubular, truncate or obscurely 5-toothed. Corolla funnel-shaped; tube long, the throat

glabrous or pilose; lobes 5, short, valvate. Stamens 5, on the throat or below the apex of the corolla-tube; filaments short, filiform; anthers oblong, apiculate. Disk annular. Ovary 2-celled; ovules numerous, on pendulous placentæ, imbricate upwards; style long, filiform; stigma much exserted, mitriform. Fruit of 2 dehiscent cocci. Seeds many; testa winged; albumen fleshy.—Species 12.—Tropical Asia, Africa.

The genus is tonic and febrifuge.

1. **Mytragyna parvifolia** Korth. Obs. Naucl. Ind. (1839) 19.—*Stephegyne parvifolia* Korth.—*Nauclea parvifolia* Willd.; Roxb. Corom. Pl. t. 52; Bedd. Fl. Sylv. t. 34.

A large deciduous tree, glabrous or pubescent. Leaves variable in size and shape, 5-12.5 by 3.8-7.5 cm., elliptic, suborbicular, or obovate, rounded, acute or bluntly acuminate at the apex, glabrous on both sides, base rounded or acute, sometimes cordate; main nerves 6-8 pairs, oblique; petioles 1-2 cm. long; stipules 13 by 5-8 mm., oblong-spathulate, obtuse, parallel-nerved, pink. Flowers greenish yellow, fragrant; peduncles solitary terminal, short, each carrying a globose head of flowers 2-2.5 cm. in diam. Calyx 2 mm. long, funnel-shaped; limb truncate. Corolla 6.3-8 mm. long; tube narrowly infundibuliform, glabrous; lobes 2.5 mm. long, triangular-ovate, acute, recurved. Style white, much exserted; stigma mitriform. Head of fruits 13-16 mm. in diam.; capsules 3 mm. long, oblong, with blunt rounded tops and 10 blunt ribs.

Distribution: Throughout the drier parts of India and Ceylon.

Among the Santals the bark and root are given in fever and colic, and the former, ground and made into a paste, is applied for muscular pains (Campbell).

Bhil: Tamak—; *Bombay:* Kadamb, Kaddam, Kalam, Kangei—; *Bundelkhand:* Khem—; *Burma:* Hteinthay—; *Canarese:* Hedu, Kadaga, Kadambe, Kadani, Nanekiyakadaga, Nayikadambe, Nirkadambe, Sannakadambe—; *Central Provinces:* Kalam—; *Garhwal:* Phaldu—; *Gond:* Mundi—; *Hindi:* Kaddam, Kallam, Kangi, Keim—; *Khond:* Pajakiru—; *Kolami:* Gui, Komba—; *Kumaon:* Phaldu—; *Kurku:* Kutebi—; *Lambadi:* Kavuksiro, Motahighora—; *Malayalam:*

Nirkkatampa, Sirakatampa, Vimpu—; *Marathi:* Kadamb, Kalam, Karamb—; *North-Western Provinces:* Kaim, Kangai, Phaldu—; *Punjab:* Kalam, Kalkam, Kam, Keim—; *Rajputana:* Guri, Gurikaram, Kumra—; *Santal:* Gore—; *Saora:* Kamba, Kambabotuka, Simabandaru—; *Sinhalese:* Helembe—; *Tamil:* Kadambai, Nichulam, Nirkkadambu, Pattakkadambu, Pudakkadambai, Sinnakkadambu—; *Telugu:* Botruga, Bottaganapa, Bottakadapa, Bottakadimi, Nirukadimi—; Pulakadimi—.

UNCARIA Schreb.

Woody climbers, often very large. Leaves more or less coriaceous. Flowers in globose heads, peduncled; peduncles without flowers converted into stout hooks. Calyx cylindric, 5-lobed. Corolla-tube long, narrow, throat glabrous, lobes 5. Stamens short on corolla-mouth. Ovary fusiform; style long, slender. Capsule fusiform, 2-valved. Seeds very numerous, minute, winged at each end.—Species 35.—Tropics.

The genus is astringent.

U. acida Roxb. is used medicinally in the Malay Archipelago, *U. tonkinensis* Havil. in Indo China, *U. kibbiensis* Hutch. in the Gold Coast.

OFFICIAL:—*U. Gambier* Roxb. in Holland,—(Hunter) Roxb. in Great Britain; *U. Gambir* Roxb. in Japan.

1. **Uncaria gambir** Roxb. Fl. Ind. I (1832) 517; Korth. Verh. Nat. Gesch. Bot. t. 34.

Slender climber (cultivated into a bush). Leaves membranous ovate acuminate, base round, glabrous except for tufts of hair at the base of main nerves 4-5 pairs beneath; 7.5-13 mm. long, 4.6-5.6 cm. wide; petioles 6 mm. long. Peduncles slender, 2.5 cm. long. Heads 4.5 cm. across, in fruit 7 cm. Calyx short-stalked, 9 mm. long, silky, tube cylindric, lobes ovate. Corolla 13 mm. long, tube slender red, sparsely silky, lobes cream white, oblong, blunt. Capsule narrow fusiform, 2.5 cm. long, pubescent. Pedicels 5-10 mm. long.

Distribution: Malay Peninsula.—Borneo, Sumatra.

Gambier is a well-known astringent; employed by the Malays in all cases requiring astringent medicines.

Bombay: Chinaikatha—; *English:* Gambier—; *Hindi:* Kath-kutha—; *Malay:* Gambir, Geta gambir—; *Telugu:* Ankudukurra—.

Hymenodictyon Wall.

Trees or shrubs with thick branches and bitter bark. Leaves opposite, petiolate, deciduous; stipules interpetiolar, glandular-serrate, deciduous. Flowers small, spicate, in axillary and terminal nodding panicles; bracts 1 or 2, foliaceous, reticulate, subpersistent; bracteoles small or 0. Calyx-tube short; lobes 5-6, ovate or subulate, deciduous. Corrolla infundibuliform or narrowly campanulate, glabrous inside; lobes 5, short, erect, reduplicate-valvate. Stamens 5, inserted below the throat of the corolla; filaments short, dilated upwards; anthers linear. Ovary 2-celled; ovules numerous, on cylindric placentæ adnate to the septum; style filiform, exserted; stigma fusiform. Capsule loculicidally 2-valved, many-seeded; placentæ at length free. Seeds imbricating upwards; testa broadly winged; embryo small in fleshy albumen.—Species 8.—Tropical Africa and Asia.

H. excelsum Wall. is used medicinally in Indo China and the Philippine Islands.

1. **Hymenodictyon excelsum** Wall. in Roxb. Fl. Ind. ed. Carey. II (1824) 149.—*H. obovatum* Wight Ic. t. 80 (non Wall.).—Plate 491.

A large deciduous tree; bark brownish grey, soft and corky in old stems. Leaves opposite, 10-25 by 7.5-12.5 cm., elliptic, ovate- or obovate oblong, abruptly acuminate, membranous, pubescent on both surfaces, narrowed into the petiole, lateral nerves 7-10 pairs; petiole 2.5-7.5 cm. long; stipules oblong, usually glandular serrate, caducous. Flowers 5 mm. long, white, fragrant, crowded on the spiciform branches of erect terminal panicles; bracts like the leaves but smaller, long petioled, persistent after the leaves have fallen; pedicels very short; bracteoles minute. Calyx 2.5 mm. long,

narrowly campanulate, pubescent; lobes 5-6, very short. Corolla 5 mm. long, pubescent outside; tube narrow cylindric; limb cup-shaped; lobes 5, short, valvate. Stamens 5, inserted below the throat of the corolla; filaments short, dilated upwards. Ovary 2-celled; ovules many; style filiform, much exserted; stigma clavate. Capsules 1.3-1.8 cm. long, ellipsoid, on stout decurved pedicels 5-13 mm. long, loculicidally dehiscent. Seeds 10 by 3.5 mm. including the membranous reticulate wing which extends all round the seed and is deeply split at the base.

Distribution: Base of Himalayas, W. Peninsula, Burma.—Java.

The bark is hot, pungent, bitter; increases taste and appetite; good for the throat; cures all tumours (Ayurveda).

The inner bark is bitter and astringent, and is used as a febrifuge. The outer layer of the bark is tasteless.

In Indo China, the powdered wood is used for herpes.

Gibson and Simonsen working on authentic samples have confirmed the presence in the bark of æsculin and scopoletin, but have not been able to confirm that of an alkaloid (*Journ. Proc. Asiatic Soc. Bengal,* 1916).

Bhumij: Burkunda—; *Bombay:* Kalakadu, Kalakurwah—; *Burma:* Khoyari, Kusan—; *Canarese:* Bataga, Doli, Gandele—; *Central Provinces:* Bohar, Potur, Putur—; *Deccan:* Bandari, Janglianar—; *Dehra Dun:* Bhaulan—; *Gujerati:* Amarachhala, Bhramarasalya, Dondro—; *Hindi:* Bandaru, Bauranga, Bhalena, Bhamina, Bhaulan, Bhohar, Bhoswar, Bhramarchhalli, Bhurkul, Bhurkur, Dhauli, Kukurkat, Phaldu, Phargur, Potur—; *Indo China:* Aulok oulek, Ban muoc, Tai nghe—; *Kangra:* Barthua—; *Kathiawar:* Bhamarchhal—; *Kolami:* Sali—; *Malayalam:* Ittiyila, Malankalli, Nishakatampa, Perantoli, Vallari, Vellakatampa—; *Marathi:* Bhaurchhal, Bhorsal, Bhramarsali, Bhursal, Dancelo, Dondru—; *Masbate:* Cucunbanuc—; *Mundari:* Burkundadaru—; *North-Western Provinces:* Bhurkur, Kukurat—; *Panch Mahals:* Dandelo, Dondru—; *Punjab:* Barthoa, Barthu, Manabina, Thab—; *Ramnagar:* Boinga—; *Sadani:* Burkundr—; *Sanskrit:* Bhramaravha, Bhramarchhallika, Bhrigatvaka, Bhringhamulika, Bhringhava, Chhalli, Kshiradru, Ugragandha—;

Santal: Bhorkhond—; *Saora:* Burija, Mokatu—; *Tagalog:* Huliganga—; *Tamil:* Ilaimergai, Malaittanakku, Naykkadambu, Perunjoli, Sagappu, Siva, Sivappu, Vellaikkadambu, Vilari—; *Telugu:* Bandaru, Burija, Duvvudippa, Manuvabillu, Pottaka, Shedippa—; *Uriya:* Bodhika, Ghono, Mundioholo, Rongobodhika—.

CINCHONA Linn.

Evergreen shrubs or trees, bark bitter, coppicing freely, stipules deciduous. Flowers pentamerous, scented, in terminal panicles, calyx pubescent, limb 5-dentate, persistent. Corolla tubular, pubescent outside, lobes valvate in bud, edge fringed with soft hairs. Ovary 2-celled, style slender with 2 short obtuse branches, papillose inside. Capsule 2-celled 2-valved, dehiscing septicidally from the base, seeds numerous peltate, the broad wings with irregularly lacerated edge, albumen fleshy.—Species 30-40.—Andes of South America from Venezuala (10° N. L.) to Bolivia (19° S. L.). Several species and varieties cultivated in India.

1. Leaves glabrous, shining above, obtuse, oblong- lanceolate, or -obovate .... 1. *C. calisaya.*
2. Leaves soft, pubescent or tomentose and often red beneath, elliptic, acute at both ends .... 3. *C. succirubra.*
3. Leaves glabrous, lanceolate or ovate-lanceolate, acute or shortly acuminate .... 4. *C. officinalis.*

Important cinchona plantations are to be found in Java, India, Bolivia and Guatemala.

OFFICIAL;—The bark of various species as mentioned under RUBIACEAE.

1. **Cinchona calisaya** Wedd. in Ann. Sc. Nat. Ser. III, X (1848) 6.

Leaves glabrous, shining above, obtuse, oblong-lanceolate or oblong-obovate, blade 7.5-15, petioles 1.3-1.7 cm. long, axillary pits indistinct. Flowers pale flesh-coloured, cymes few-flowered, arranged in a terminal pyramidal panicle, the lower branches in the axils of leaves. Corolla 8-17 mm. long, lobes lanceolate, rose-coloured, fringe of hairs pure white. Capsule ovoid-oblong, 8-17 mm. long.

Distribution: Native of Bolivia—wild and cultivated—and Peru. Grown in India, Java, Cameroons, etc.; succeeds at elevations of from 1,500—3,000 ft. in Sikkim (27° N. L.).

The bark is a source of quinine.

Cantonese: Naap P'i, Nah P'i—; *English:* Bolivian Bark, Calisaya Bark, Yellow Bark—; *French:* Quinquina calissaga, Quinquina jaune, Quinquina jaune royal, Quinquina royal—; *Malaya:* Kai na phee—; *Portuguese:* Quina amarella, Quina calisaya, Quina real—.

2. **Cinchona calisaya** Wedd. var. **ledgeriana** Howard in Quin. E. Indian Plant. (1876) 86.—*C. Ledgeriana* Moens. ex Trimen Journ. Bot. XIX (1881) 323.

Leaves glabrous, lanceolate or elliptic-oblong, acute, blade 7.5-15 cm., petiole 6-8 mm. long, those of coppice shoots much larger. Flowers strongly scented, yellowish white on pedicels 4 mm. long, inflorescence like C. calisaya. Corolla 8-13 mm. long, tube pentagonous, lobes same colour as tube, fringed with very long white hairs. Capsule ovoid-lanceolate 8-13 mm. long on pedicels 6-8 mm. long.

Distribution: Native of Bolivia. Cultivated in India, Java, Tanganyika, Cameroons, etc.

The bark is a source of quinine.

English: Ledger Bark, Ledger Hybrid Bark—.

3. **Cinchona succirubra** Pavon ex Klotzsch in Abh. Akad. Berlin (1857) 60.— *C. pubescens* Vahl.

A large tree, attaining 24 m. Leaves soft pubescent or tomentose, and often red beneath, elliptic, acute at both ends, blade 15-30 cm., petiole 2.5-3.8 cm. long, no pits in the axils of secondary nerves. Flowers rose-coloured, cymes compact in a large pyramidal thyrsus, corolla 1.3-2 cm. Capsule oblong, narrowed towards the apex, 2.5-3.2 cm. long.

Distribution: Native of Ecuador.—Cultivated in India, Burma, Java, Ceylon, Jamaica, S. Thomas (W. Africa), Tanganyika, Cameroons. Succeeds at altitudes of from 3,000—6,000 ft.

The bark is a source of quinine.

English: New Grenada Bark, Red Bark—; *French:* Quinquina rouge—; *Portuguese:* Quina do Chimborazo, Quina vermelha—.

4. **Cinchona officinalis** Linn. Syst. ed. X (1759) 929.—*C. condaminea* Linn.

Leaves glabrous, lanceolate or ovate-lanceolate, acute or shortly acuminate, blade 7.5-15 cm., petiole 2.5-3.8 cm. long, secondary nerves 8-10 pairs, hairy pits in their axils. Flowers red, in short corymbiform compound cymes, terminal and axillary, corolla-tube densely silky with white appressed hairs, slightly pentagonal, 1.3-1.7 cm. long, capsules ovoid-oblong, 1.7-2 cm. long.

Distribution: Native of Ecuador, also in Columbia, Peru and Bolivia.—Cultivated in S. India, Ceylon, etc. Thrives at higher elevations (6,000—8,500 ft. in the Nilgiris) better than any other of the species.

The bark is a source of quinine.

English: Crown Bark, Pale Bark—; *French:* Quinquina gris—.

Oldenlandia Linn.

Slender erect or diffuse di- tri- chotomously-branched usually glabrous herbs. Leaves opposite, usually small, narrow; stipules acute or bristly. Flowers small, white or pink, in dichotomous axillary and terminal usually panicled cymes, rarely solitary. Calyx-tube turbinate, obovoid or subglobose; teeth 4 (rarely 5), usually erect and distant in fruit; sometimes with alternating teeth. Corolla rotate, infundibuliform or hypoctateriform; tube short or long; lobes 4 (rarely 5), obtuse, valvate. Stamens 4 (rarely 5), inserted in the throat of the corolla; filaments short; anthers usually exserted. Ovary 2-celled; ovules numerous, the placentæ attached to the septum; style filiform; stigmas 2, linear. Capsule small, usually membranous, terete, didymous or angled, loculicidal at top, rarely indehiscent, many-seeded. Seeds angled, globose or ellipsoid; testa not winged, smooth or pitted; embryo clavate in fleshy albumen.—Species about 80.—Tropical and subtropical, chiefly Asiatic.

A. Capsule indehiscent or late dehiscent or the crown only dehiscing loculicidally

Capsule indehiscent .... 4. *O. auricularia.*

B. Capsule dehiscent loculicidally in the upper part, sometimes nearly to the base		
I. Peduncles 1-4-flowered from the lower or all the axils Leaves linear, not exceeding 3 mm. broad; bases of calyx-teeth not touching the fruit		
a. Top of capsule flat, not protruded		
1. Flowers pedicelled, usually in pairs	1.	*O. corymbosa.*
2. Flowers sessile or nearly so, solitary	6.	*O. diffusa.*
b. Top of capsule rounded, protruded	3.	*O. herbacea.*
II. Peduncles many-flowered, chiefly from the axils Flowers in umbels; pedicels very short	2.	*O. umbellata.*
C. Capsule very variable, turbinate didymous or hemispheric, terete or 4-ribbed	5.	*O. biflora.*

Bechic, antipyretic and anthelmintic.

The following species are used medicinally in Indo China—*O. corymbosa* Linn., *O. fraterna* Pierre, *O. umbellata* Linn.—; in Malaya—*O. herbacea* Roxb.—; in the Philippine Islands and South America—*O. corymbosa* Linn.—; in Abyssinia and Senegambia—*O. senegalensis* Hiern.—; in the Gold Coast—*O. macrophylla* DC.—; in Madagascar—*O. lancifolia* DC.—; in South Africa—*O. amatymbica* Kuntz., *O. decumbens* Hiern.—.

1. **Oldenlandia corymbosa** Linn. Sp. Pl. (1753) 119.—*O. ramosa* Roxb. Fl. Ind. I (1832) 424.—Plate 492B.

Annual, varying from 7.5-38 cm. high; stems terete, numerous, slender, erect, ascending or spreading, glabrous or pubescent. Leaves subsessile, 2-4.5 cm. by 1.5-4 mm., linear or linear-lanceolate, acute, often with recurved and frequently scabrous margins; stipules short, membranous, truncate, with a few short bristles. Flowers on filiform pedicels longer than the calyx, usually 2-3 (rarely 1 or very rarely 4) on the top of a very slender axillary solitary peduncle; bract beneath the pedicels 1.25-1.5 mm. long, subulate. Calyx 2 mm. long, pubescent; teeth narrowly triangular, about equalling the calyx-tube when in flower. Corolla white, 2.5 mm. long; lobes acute, about 1.25 mm. long. Capsules globose or sometimes slightly pyriform, somewhat didymous, the top rather flat and not protruded beyond the calyx, glabrous. Seeds pale brown, angular.

Distribution: Throughout India, Ceylon.—Tropical E. Asia to Java and the Philippines.

By Sanskrit authors it is considered a cooling medicine of importance in the treatment of fevers supposed to be caused by deranged air and bile, that is, remittent fever, with gastric irritability and nervous depression. The entire plant is prescribed in decoction.

In the Konkan, the juice is applied in burning of the palms of the hand and soles of the feet from fever; in burning at the pit of the stomach the juice is given internally with a little milk and sugar (dose 1 tola of the juice obtained by pounding the plant with water). The decoction is given in remittent fever, and is also applied to the surface of the body. It is also given internally to cure heat eruptions.

The plant is also given in jaundice and diseases of the liver, and used as an anthelmintic.

The plant is used as a febrifuge throughout Indo China. In the Martinique, it is considered vermifuge.

Bengal: Khetpapra—; *Goa:* Kazuri, Popalo—; *Gujerati:* Parpat—; *Hindi:* Damanpapar—; *Indo China:* Coc man, Luoi ran, Vo chu—; *Malay:* Sibu, Siku-Siku, Telor b'lankas—; *Marathi:* Papti, Phapti—; *Nepal:* Piriengo—; *Sanskrit:* Parpata—; *Sinhalese:* Valpatpaadagam—.

2. **Oldenlandia umbellata** Linn. Sp. Pl. (1753) 119.—PLATE 492A.

Annual; stems semi-woody at the base, 15-25 cm. high, much-branched from the base; branches more or less angular and rough. Leaves numerous, often fascicled, rather close, sessile, 13-25 by 3-4 mm., linear, flat, very acute; stipules short, pectinate. Flowers 3-10, in small irregular axillary peduncled umbels; peduncles usually longer than the leaves, stout, erect, pubescent; pedicels very short, pubescent. Calyx (in flower) 3 mm. long; teeth 2 mm. long, triangular, cuspidate, ciliolate. Corolla 3 mm. long, glabrous on both sides; lobes triangular-oblong, equalling the tube. Capsules globose, 2.5 mm., glabrous, crowned with the not very distant calyx-teeth, the top of the capsule not protruded.

Distribution: Orissa, Bengal, Burma, Deccan, Circars, Carnatic.

The leaves are considered expectorant and are given to such as suffer from consumptive and asthmatic affections.

The leaves and root of this plant are considered to possess strong expectorant property and are prescribed in cases of bronchial catarrh, bronchitis, and asthma. A decoction of the root 1 in 10 was given in doses of ½ to 1 ounce a day to cases of bronchitis and asthma. In the former diseases, the patients were cured after a few days' use of the decoction; but in the latter, the drug gave only temporary relief (Koman).

The root is said to be used as a specific in snake-bite (Watt); but the root is not an antidote to snake-venom (Mhaskar and Caius).

Bengal: Surbuli—; *Ceylon:* Chaya—; *English:* Chaya Root, Indian Madder—; *French:* Chayavair—; *Hindi:* Chirval—; *Indo China:* Luoi noc—; *Lepcha:* Kalhenyok—; *Malayalam:* Chayaver—; *Sinhalese:* Saya, Sayanmull—; *Spanish:* Chaya de la India, Chaya-ver—; *Tamil:* Chiruver, Emburel, Imbural, Imburaver, Saya—; *Telugu:* Cherivelu, Chiriveru, Chiruveru—; *Uriya:* Surbuli—.

3. **Oldenlandia herbacea** Roxb. Hort. Beng. (1814) 11.

An erect glabrous annual or biennial 7.5-45 cm. high; branches numerous, dichotomous, slender, 4-gonous, divaricate. Leaves 1-3.2 cm. by 0.8-3 mm., the lower leaves often broader than the upper ones, sessile, linear or linear-lanceolate, acute, glabrous, usually with recurved margins; stipules very short, inconspicuous or very shortly setose. Flowers usually on solitary or 2-nate axillary filiform peduncles, sometimes however (especially the upper flowers) forming a paniculate cyme. Calyx-teeth triangular-subulate, acute, distant on the fruit, very short. Corolla 4 mm. long; tube 3 mm. long, slender. Capsules 2.5 mm. diam., ovoid or subglobose, somewhat didymous, the crown much protruded beyond the calyx, glabrous. Seeds somewhat ellipsoid in outline.

Distribution: Throughout India in hilly districts.—Malay Islands, tropical Africa.

In addition to a liquid extract, a decoction of this drug 1 in 10 was tried in mild cases of malarial fever of a low remittent type and was found to do good in a few of those cases (Koman).

4. **Oldenlandia auricularia** K. Schum. in Engl. and Prantl

Nat. Pflanzenf. IV. 4 (1891) 25.—*Hedyotis Auricularia* Linn. Sp. Pl. (1753) 101.

Annual; branches numerous, prostrate or suberect, spreading, not rooting at the nodes, glabrous or hairy especially at the nodes, often purple when young. Leaves sessile, subsessile or shortly petioled, ovate or ovate-lanceolate or sometimes quite lanceolate, acuminate, glabrous or slightly pubescent on the nerves above, hairy on the nerves beneath, base acute or rounded; main lateral nerves impressed above, prominent beneath, curved; petioles very short or 0; stipules membranous, furnished with 3 or 5 unequal filiform bristles. Flowers white, sessile or very shortly pedicelled, in dense sessile or subsessile axillary cymes. Calyx-teeth small, triangular or lanceolate, acuminate. Corolla-tube very short; lobes oblong obtuse, recurved, hairy at the base. Capsules globose, hard, hairy or nearly glabrous, indehiscent.

Distribution: Almost all over India, Ceylon.—Malay Archipelago, S. China, Philippines, Australia.

The plant has emollient properties; it is used in dysentery and cholera.

Bengal: Muttialata—; *Bombay:* Dapoli—; *Sinhalese:* Gatta-colla—.

5. **Oldenlandia biflora** Linn. Sp. Pl. (1753) 119.—*O. paniculata* Burm. f.—*Hedyotis racemosa* Lam.; Wight Ic. t. 312.

Glabrous annual erect, branched; branchlets 4-angled or winged. Leaves thin elliptic subactue, base narrowed; nerves indistinct; 1-2 cm. long, 5-8 mm. wide; petioles 2.5 mm. long. Cymes terminal or in upper axils on peduncles as long or twice as long as leaves, lax, few-flowered. Flowers under 2.5 mm. long, white. Calyx campanulate, teeth 4. Corolla little longer. Capsule turbinate, over 2.5 mm. across.

Distribution: Carnatic, Ceylon, E. Bengal, Sikkim, Assam, Sylhet, Pegu, Malay Peninsula.—Malay and Philippine Islands, China, Polynesia.

The plant is used in remittent fever, gastric irritation, and nervous depression.

Bengal: Khetpapra—; *Hindi:* Damanpapra—.

6. **Oldenlandia diffusa** Roxb. Hort. Beng. 11.

Annual, diffuse, glabrous; stems numerous, prostrate, often rooting at the nodes. Leaves subsessile, 2-3.2 cm. by 1.25-3 mm., linear or linear-lanceolate, acute, glabrous; stipules short, slightly pectinate. Flowers usually solitary (rarely 2 together), sessile or on very short pedicels. Calyx-teeth long, narrowly triangular, cuspidate, finely ciliate, very distant in fruit. Capsules larger than in *O. corymbosa*, broader than long, very truncate and flat on the top, not protruded beyond the calyx. Seeds angular.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Tropical Asia to Borneo, Philippines, Japan.

A decoction of the plant is used as a blood-purifier; it is prescribed in biliousness, fever and gonorrhœa.

Malay: Rumput injah—; *Visayan:* Aguho, Daniri—.

OPHIORRHIZA Linn.

Erect, creeping or decumbent small herbs, rarely undershrubs. Leaves opposite; stipules interpetiolar, caducous. Flowers secund on the branches of axillary or terminal dichotomous cymes, with or without bracts. Calyx-tube short; lobes 5, small, persistent. Corolla tubular or funnel-shaped; lobes 5, valvate in bud, often winged or appendaged at the back, sometimes also with a fold in the sinus. Stamens 5, inserted below the throat of the corolla, usually included; anthers linear. Disk of 2 large prominent erect lobes which become much enlarged in fruit. Ovary 2-celled; ovules many in each cell, inserted on basal ascending placentæ; style filiform; stigmas 2, broad or linear. Capsule coriaceous, compressed, obcordate, girt by the calyx-limb, the crown dehiscing by 2 broad gaping valves; placentæ divaricating, many-seeded. Seeds minute, angled; testa thinly crustaceous; embryo clavate in fleshy albumen.—Species 80.—Indo-Malayan.

O. Mungos Linn. is used medicinally in Guiana.

1. **Ophiorrhiza mungos** Linn. Sp. Pl. (1753) 150.—PLATE 493.

Herbaceous, never shrubby, stem 45-60 cm., erect, cylindrical, slightly branched, glabrous or very finely puberulous. Leaves rather large, 10-20 cm., lanceolate, much tapering at base and decurrent on short petiole, shortly acuminate, subacute, glabrous above, finely puberulous on veins beneath, thin, bright green above, pale beneath, lateral veins very numerous, depressed above, prominent beneath, stipules very short; cymes several, horizontally spreading, arranged subumbellately in a fiat-topped terminal inflorescence quite without bracts. Flowers on short pedicels; calyx-segments very short, triangular, corolla-tube inflated at base, broad, with a ring of long silky hair at mouth, lobes much shorter than tube. Disk very prominent. Capsule 1 cm. wide, coriaceous, 3 times as wide as long, very much compressed, protruded beyond calyx. Seeds very numerous, angular, pale brown.

Distribution: Khasia Hills, up to 2,000 ft., Burma, Tenasserim, Andamans, Nicobars, W. Ghats from Wynaad to the Anamalais and the hills of Travancore and Tinnevelly.

The root is bitter, pungent, hot; anthelmintic, alexipharmic (Ayurveda).

The root is intensely bitter and may be used as a tonic. It is popularly believed to be a remedy against the bites of venomous snakes, mad dogs, etc.

"The bark of the root of this plant, I was told by a physician of the West Coast possessed laxative and sedative properties. He gave the following directions for its administrations:—Take the bark of the root of this plant, grind it into a paste and make boluses of the size of the lime each. Give one of these in milk early morning for three days. This would keep maniacs quite and move their bowels freely."—The Superintendent of the Lunatic Asylum, Madras, to whom I sent this drug for trial, reported after its administration to two cases that it did not possess the properties attributed to it (Koman).

The plant (Sushruta) or the root (Ayurvedaprakasha) are recommended for the treatment of snake-bite. The expressed juice

of the fresh roots, stem, and leaves is mixed with human urine and about half a teaspoonful poured into each nostril in stupor and coma (Roberts). A decoction of the fresh roots, bark and leaves is given internally (Roberts).

Sushruta prescribes the root in the treatment of scorpion-sting.

All parts of the plant are useless in the antidotal treatment of snake-bite; and they are equally useless as an errhine (Mhaskar and Caius). The root is not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Gandhanakuli—; *Canarese:* Garudapatala, Patalagaruda—; *Cebu:* Cayobcob—; *English:* Indian Snake Root, Mongoose Plant—; *French Guiana:* Bois de couleuvre, Mungo, Racine de couleuvre, Racine de Jean Lopez, Racine d'or—; *Hindi:* Sarahati—; *Java:* Kajoular—; *Malayalam:* Avilpori, Avilpuri—; *Marathi:* Mungusavela—; *Sanskrit:* Bhiyangakshi, Chhatrika, Gandali, Gandhanakuli, Garudaputa, Nadikalapaka, Nakuleshtha, Nakuli, Nava, Patalabhedi, Patalagaruda, Rasna, Sarpakshi, Sarpari, Sugandha, Surasa, Suvaha—; *Sinhalese:* Dalkattiya, Walekaweriya—; *Tamil:* Kirippundu, Kirippurandan, Sadaichi—; *Telugu:* Sarpakshi, Surpashechettu—; *Tulu:* Patalagarude—.

MUSSAENDA Burm. ex Linn.

Shrubs or undershrubs (rarely herbs), erect or climbing. Leaves opposite or 3-nately whorled; stipules interpetiolar, solitary or twin, usually deciduous. Flowers yellow or scarlet (rarely white) in terminal cymes; bracts and bracteoles deciduous. Calyx-tube oblong or turbinate; lobes 5, usually deciduous, one frequently forming a large stalked white or coloured leaf. Corolla infundibuliform; tube usually silky, throat villous; lobes 5, short, induplicate-valvate. Stamens 5, inserted in the throat of the corolla or lower down; filaments very short; anthers linear. Ovary 2-celled; ovules very numerous in each cell, on peltate fleshy placentæ; style filiform; stigmas 2, linear. Fruit a fleshy berry, areolate at the apex, many-seeded. Seeds minute; testa pitted; embryo minute in dense fleshy albumen.—Species 60.—Palæotropics.

Bark antiperiodic and antidiarrheic. Leaves tonic and antiperiodic. Flowers expectorant, diuretic and antiperiodic.

The following are used medicinally in Indo China—*M. cambodiana* Pierre, *M. dehiscens* Craib., *M. frondosa* Linn., *M. rhederiana* Hutch., *M. theifera* Pierre—; in Madagascar and Mauritius —*M. arcuata* Poir.—; in La Reunion—*M. arcuata* Poir., *M. landia* Poir.—.

1. **Mussaenda glabrata** Hutch. in Gamble Fl. Madras 610.—*M. Frondosa* var. *glabrata* Hook. f. in Fl. Brit. Ind. III, 90.—PLATE 494 (under *M. frondosa* Linn.).

A rambling shrub, climbing by its long flexuous divaricate branches which are cylindric and appressedly hairy (rarely glabrous). Leaves 7.5-12.5 by 5-9 cm., broadly elliptic, shortly acuminate, more or less pubescent (rarely glabrous) above, pubescent on the nerves and on the numerous reticulate veins beneath, base rounded or often tapering into the petiole; main nerves 8-12 pairs conspicuous on both surfaces, curving upwards; petioles 6-25 mm. long, more or less appressedly hairy; stipules twin, 6 mm. long and about 2.5 mm. broad at base, linear-lanceolate, very acute, hairy. Flowers in terminal somewhat open cymes; peduncles stout, coarsely hairy; pedicels short, hairy; buds densely hairy, clavate, 5-angled; bracteoles subulate. Calyx-teeth reaching 1.6 cm. long, linear-subulate, hairy, the enlarged segments (only developed on the outer side of a few flowers) leaf-like, creamy white, persistent, 6.3-11.5 by 3.8-6.3 cm., broadly ovate or elliptic, acuminate usually tapering at the base, more or less velvety when young, when older nearly glabrous or with a few scattered hairs, strongly 5-7-nerved from the base and reticulately veined between the nerves, the stalk about 1.3-2.5 cm. long. Corolla 2.8-3.8 cm. long, of a deep golden-yellow; tube slender, very hairy outside and with a dense lining of yellowish hairs completely blocking the mouth; lobes 6 mm. long, broadly ovate or elliptic, apiculate, pubescent on the back. Berries 10-13 cm., subglobose or obovoid, glabrous.

Distribution: Tropical Himalaya, Assam, Andamans, Konkan, Deccan, W. Ghats of Bombay Pres., N. Kanara, W. Ghats of S. Kanara, Malabar and Tinnevelly Hills.

In the Konkan, ½ a tola of the root is given with cow's urine in white leprosy.

In jaundice, 2 tolas of the white leaves are given in milk.

In Indo China, the flowers are considered pectoral and diuretic. They are given in asthma, intermittent fevers and dropsy. Externally they are applied as a detergent to ulcers.

Bombay: Bebana, Bhutakesa, Landachuta—; *Burma:* Ywcthla—; *Cambodia:* Thmey prey—; *Canarese:* Bellotti, Billoothi, Hasthygidda, Ipparati, Pathri—; *Hindi:* Bedina—; *Indo China:* Buom lac, Buom vang—; *Konkani:* Daspathry—; *Lepcha:* Tumberh—; *Malay:* Balik adap—; *Malayalam:* Vellila, Vellimayittali—; *Marathi:* Bhurtkasi, Bhutkes, Churtkasi, Lavasat, Sarwadh, Sherwod, Shivardole—; *Nepal:* Asari—; *North-Western Provinces:* Babina—; *Philippine Islands:* Bulaclacnangdalaya, Matinggai—; *Sanskrit:* Nagavalli, Shrivati—; *Sinhalese:* Maasenda—; *Tamil:* Vellaiyilai, Vellimadandai—; *Tulu:* Bolletappu—; *Tringgame:* Cha pedi—.

RANDIA Houst. ex. Linn.

Trees and shrubs unarmed or spinous. Leaves opposite, or with one of the pair often arrested; stipules short, intrapetiolar, free or connate. Flowers rather large, solitary and terminal or in axillary or leaf-opposed cymes, white or yellowish. Calyx-tube ovoid or turbinate, ribbed or terete; limb often tubular, truncate, toothed or lobed, the lobes sometimes foliaceous. Corolla various; tube long or short, the throat glabrous or villous; lobes 5 (rarely more), short or long, twisted in bud. Stamens 5 (rarely more); anthers subsessile, narrowly linear. Disk annular or cushion-shaped. Ovary 2-celled; ovules numerous, sunk in fieshy placentæ; style short or slender; stigma large, clavate or fusiform, entire or 2-fid. Berry globose, ovoid or ellipsoid, 2-celled, many-seeded. Seeds often immersed in pulp, angled; testa thin; albumen horny; cotyledons orbicular.—Species 125. —Tropics.

A. Flowers 1-3, terminal. Calyx-limb persistent
   1. Flowers exceeding 3.8 cm. diam. Fruit exceeding 5 cm. diam. .... 1 *R. uliginosa.*

2. Flowers and fruit both less than 2.5 cm. diam.	2. *R. dumetorum.*
3. Flowers 2.5 cm. diam. Fruit 3.8-4.5 cm. diam.	5. *R. tomentosa.*
B. Flowers in shortly peduncled cymes	4. *R. longiflora.*
C. Cymes axillary, leaf-opposed. Berry globose, usually small and soft	3. *R. densiflora.*

Bark astringent and antiperiodic; fruit emetic and antidysenteric.

The following species are used medicinally in Indo China—*R. densiflora* Benth., *R. dumetorum* Lam., *R. longiflora* Lam., *R. tomentosa* Hook. f.—; in the Philippine Islands—*R. dumetorum* Lam.—; in Madagascar—*R. talanguinia* DC.—.

1. **Randia uliginosa** DC. Prodr. IV (1830) 386.—*Gardenia uliginosa* Retz.; Roxb. Corom. Pl. t. 135.—*Posoqueria uliginosa* Roxb. Fl. Ind. I (1832) 712.—Plate 495.

A small tree rarely reaching 6 m. high; bark reddish brown, scaly; branches numerous, thick, horizontal (the younger 4-angled). many of them short and terminating in 1-2 pairs of strong sharp thorns 1.3 cm. long. Leaves fascicled on suppressed branchlets, thin, 6.3-12.5 by 3.5-5 cm., obovate or obovate-oblong, obtuse, glabrous above, more or less pubescent and reticulately veined beneath, tapering to the base; main nerves 6-8 pairs; petioles very short; stipules acute from a broad base. Flowers solitary at the ends of suppressed branches, white, fragrant, 3.8-5 cm. diam.; pedicels short. Calyx 1.3 cm. long, fleshy green; limb broadly tubular with 5-7 broad rounded ciliate shallow lobes scarcely 3 mm. long. Corolla glabrous outside; tube very short with a ring of white hairs at the mouth; lobes 5-7, orbicular, much overlapping. Stamens 5-7, sessile. Ovary 2-celled; ovules many; style ribbed; stigma large and sub-convolute spiral laciniæ. Fruit 5-6.3 cm. long, ovoid, smooth, yellowish brown, crowned with the persistent calyx-limb, 2-celled. Seeds numerous, compressed, smooth, closely packed in pulp.

Distribution: Throughout India, Ceylon.

The root is sweet, cooling, diuretic (Ayurveda).

The root is tasteless; tonic, aphrodisiac, hæmatinic, diuretic; good in thirst, for the heart, in boiles in children, in biliousness, dysuria, strangury (Yunani).

The unripe fruit roasted in wood ashes is used as a remedy in diarrhœa and dysentery, the central portion consisting of the stone and seeds being rejected; it is astringent. The root, boiled in ghi, is sometimes given in similar cases.

Bengal: Piralo—; *Bhil:* Tapkel—; *Bijnor:* Banpindalu—; *Bombay:* Kanthagoting, Katul, Panar, Pendari, Pendra, Telphetru—; *Burma:* Hmanbyu, Mhanhpyoo, Mhaniben, Nyangyee—; *Canarese:* Banbugri, Doddakare, Garudakare, Kare, Ollekare, Pandri, Pannadri—; *English:* Grey Emetic Nut—; *Gond:* Katil, Pender—; *Gorakhpur:* Paniya—; *Gujerati:* Gangeda—; *Hasada:* Kindarkom-daru—; *Hindi:* Bharani, Katul, Panar, Paniah, Penaura, Pendua, Pindalu, Pindar, Pindara, Pindora—; *Kolami:* Kumkum, Pindar—; *Konkani:* Pindara—; *Kumaon:* Pindaru—; *Kurku:* Gangaru, Gangru—; *Malayalam:* Kara, Punankara—; *Marathi:* Cindra, Penebra, Pendroy, Pendru, Phetra, Pindra, Telphetru—; *Mundari:* Kumbikum—; *Melghat:* Purputa—; *Naguri:* Tholkodaru—; *Nepal:* Maidal—; *Oudh:* Panar—; *Panch Mahals:* Kauria, Kaurio—; *Porebunder:* Gangada—; *Ramnagar:* Pindalu—; *Saharanpur:* Pandara; *Sanskrit:* Devatamalla, Gangati, Pindalu—; *Santal:* Pinde—; *Shan:* Hmanbyu—; *Sinhalese:* Eltukuruman, Wadiga—; *Tamil:* Karai, Perungarai, Valikkarai, Vargarai—; *Telugu:* Adi-vimanga, Devatamalle, Guhyaku, Kondamanga, Nallakokkita, Nalla-manga, Peddamranga—; *Urdu:* Pindalu—; *Uriya:* Pendoroha, Potua—.

2. **Randia dumetorum** Lamk. Tab. Encycl. II (1793) 227. (Split up into 3 species by Gamble, Kew Bull. (1921) 312).—PLATE 496.

A large shrub or small tree armed with strong straight nearly opposite decussate spines 1.3-3.2 cm. long, coming off from above the branchlets; branches horizontal, rigid, many of the lateral ones suppressed and very short. Leaves usually fascicled on the suppressed branches, 3.2-5.7 by 2-3.2 cm., obovate, obtuse, wrinkled, shining above, more or less pubescent above and on the nerves beneath (especially when young), base cuneate; main nerves 6-10 pairs; petioles 3-1 mm. long, densely pubescent; stipules ovate,

acuminate. Flowers at the ends of short leaf-bearing branchlets, fragrant, solitary or 2 (rarely 3) together; peduncles short. Calyx 1.3 cm. long, densely hairy; tube broadly campanulate; teeth 5, foliaceous, 5 mm. long, ovate-oblong, subacute, often with small intermediate teeth between. Corolla 2 cm. long, at first white, afterwards becoming yellow; tube 5-6 mm. long, densely hairy outside; lobes 1.3 cm. long and nearly as broad as long, obovate-oblong, rounded at the apex, pubescent outside, spreading. Fruit like a small crab-apple, yellowish, globose or broadly ovoid, smooth or obscurely longitudinally ribbed, crowned with the large calyx-limb, 2-celled, glabrous; pericarp thick. Seeds many, flat, imbedded in pulp.

Distribution: Throughout India, Ceylon.—Java, Sumatra, S. China, E. tropical Africa.

The fruit is bitter, sweet; heating, aphrodisiac, emetic, carminative, alexiteric, antipyretic; cures abscess, ulcers, inflammations, tumours, skin diseases, " vata " and " kapha ", piles (Ayurveda).

The fruit has a bitter bad taste; emetic, purgative, carminative; useful in chronic bronchitis, pain in the muscles, paralysis, inflammations, leprosy, boils, eruptions; clears the brain; used in diseases of the brain, asthma, bronchitis, leucoderma (Yunani).

Externally applied, it acts as an anodyne in rheumatism.

The pulp of the fruit is believed by many native practitioners to have also anthelmintic properties, and is sometimes used as an abortifacient. Ground into a coarse powder and applied thus to the tongue and palate, it is highly esteemed as a domestic remedy for the fevers and incidental ailments which children are subject to, while teething (Murray).

The bark is given internally and is also applied externally when the bones ache during fever.

An infusion of the bark is used as a nauseating medicine. It is also applied to bruises, mixed with cowdung.

The bark of the tree is astringent. In colic, the fruit is rubbed to paste with rice water and applied over the navel.

It is also used to poison fish.

In Ceylon, the root decoction is taken for diarrhœa and biliousness.

In Indo-China, the powdered fruit is used as an emetic; the pounded root is employed to kill fish.

Moodeen Sheriff has found the drug a good substitute for Ipecacuanha in dysentery. He recommends the powdered pulp as the most convenient form of administration. Dose: 40 grains as an emetic; 15 to 30 grains in dysentery.

The fruit in combination with other drugs is prescribed for the treatment of snake-bite and scorpion-sting (Sushruta, Charaka). The fruit is one of the ingredients which enter into the preparation of the Tanjore Pill, a famous snake-remedy.

In snake-bite the dried pulp of the fruit is given internally in powder form; the roots are ground with human or ox-urine and applied to the eyes in stupor and coma (Roberts).

The root and the fruit are useless in the antidotal and symptomatic treatment of snake-bite; the root is also useless as a collyrium (Mhaskar and Caius). The fruit is not an antidote to scorpion-venom (Caius and Mhaskar).

The fruit has been studied chemically (Journ. Chem. Soc.; 1895).

Arabic: Jauzulaki, Juzulkosul—; *Assam:* Gurol—; *Bengal:* Madan, Menphal—; *Bhil:* Gali—; *Bombay:* Ghela, Gehela, Gelaphal, Gelaphala—; *Burma:* Hsaythanpaya, Sethanbaya, Thaminsa—; *Canarese:* Aremadalu, Aremapala, Kare, Karigidda, Karikaremullu Katmangari, Mangase, Mangari, Minakare—; *Deccan:* Gehela, Piaralu—; *English:* Common Emetic Nut—; *Gond:* Katul, Kuay—; *Gujerati:* Medhola, Mindhal, Mindhala—; *Hindi:* Arar, Karhar, Madan, Main, Maindal, Mainhuri, Mainphal, Manneal—; *Indo China:* Gang gang trau, Gang tu hu—; *Kolami:* Pato Portoho—; *Konkani:* Gaddi—; *Kumaon:* Karhar, Mainphal, Manyul—; *Kurku:* Bhita—; *Lambadi:* Mendlero—; *Lepcha:* Panji—; *Malayalam:* Kara, Karalikkaya, Kattunaranna—; *Marathi:* Galay, Gel, Gelaphala, Gera, Ghela, Madan, Mindhal, Monigeli, Peralu—; *Merwara:* Ghetu—; *Michi:* Gundrow—; *Mundari:* Johara—; *Nepal:* Amuki, Maidal, Maidaphul—; *North-Western Provinces:* Karhar, Main, Maini,

Mainphal, Manyul—; *Persian:* Juzulkueh—; *Punjab:* Arara, Mandkolla, Mindhal, Mindla—; *Rajbanshi:* Gurol—; *Ronga:* Cherole—; *Sanskrit:* Bastishodhana, Chharddana, Dharaphala, Galla, Ghantala, Granthiphala, Kaitarya, Kantaki, Kantha, Karahata, Karahataka, Madana, Marubaka, Maruvaka, Muchukunda, Pichuka, Pindinata, Pinditaka, Ramachhardanaka, Ratha, Shalya, Shalyaka, Tagara, Vishapushpaka—; *Santal:* Boibindi, Loto—; *Sind:* Juzulmaindal—; *Sinhalese:* Kukuruman, Valikukuruman—; *Tagalog:* Sinampaga—; *Tamil:* Kadudam, Kalagam, Karai, Karadam, Karudam, Madukkarai, Marukkalam, Marukkarai, Pungarai, Sirattagalagam—; *Telugu:* Madanamu, Manda, Manga, Mangara, Mangu, Mranga, Sinnamanga—; *Tulu:* Aremapala—; *Urdu:* Mainphal—; *Uriya:* Potua—.

3. **Randia densiflora** Benth. Fl. Hongkong 155.

A tree about 12 m. tall or a shrub. Leaves coriaceous, elliptic-oblong to oblong-lanceolate, base cuneate; nerves 8 or 9 pairs, elevate beneath; 10-15 cm. long, 4.5-7 cm. wide; petioles 6-8 mm. long. Cymes axillary only, subsessile puberulous, much-branched, many-flowered, 6.3 cm. wide. Flowers 1 cm. long, white, glabrous on pedicels 2.5 mm. long. Calyx tubular campanulate, 2.5 mm. long, teeth minute. Corolla-tube little longer, mouth hairy, lobes oblong much longer, reflexed oblong, edges pubescent outside, 4 mm. long. Style long, projecting. Fruit small, pea-shaped, orange.

Distribution: Assam, Naga Hills, Cachar, Tenasserim, Nicobars, Andamans, Malay Peninsula, Travancore.—Malay Archipelago, N. Australia, Hongkong.

The bark is very bitter and is given in Indo China in the so-called " forest fever." In Cambodia, the wood is prescribed in the treatment of paludism.

Indo China: Chan tonea, Chia hai, Ta hai, Tra vo, Tra vo nui, Tre vo—.—*Malay:* Berumbong jantan, Bunga Kepinis, Bunga mengkunyit, Gading tulang, Geruseh jantan, Geruseh pudih, Mata ular, Merombong jantan, Musira mata Kerbau, Tampoi bhong—.

4. **Randia longiflora** Lamk. Encycl. III, 26.

A very thorny scrambling shrub with rather slender branches, thorns hooked, 7.5 mm. long. Leaves coriaceous, dull light green,

oblong or obovate subacute, base cuneate; nerves 5-6 pairs, faint; 4.5-10 cm. long, 2-4.5 cm. wide; petioles 2.5-4 mm. long. Cymes terminal, falsely axillary on short reduced lateral branches, umbellate; peduncle 2.5 mm. long; branches as short with numerous stout lanceolate-acuminate bracts; pedicels slender, 6 mm. long. Calyx glabrous campanulate with rather long triangular acuminate teeth, 5 mm. long. Corolla-tube 2.5 cm. long, slender, lobes lanceolate acute, 1.3 cm. long, all white (withering yellow). Fruit globose ovoid, glabrous, 9 mm. long, green. Seeds wrinkled.

Distribution: Assam, Chittagong, Andamans, Nicobars and Malay Peninsula.—Malay Islands.

The berries are used medicinally in Indo China, but information as to their use is wanting.

Indo China: Ac ho, Dok khao, Mo tro, Nut, Trach kol—; *Malay:* Akar bedara laut, Akar duri, Akar Kukulang—.

5. **Randia tomentosa** Hook. f. in Fl. Brit. Ind. III, 110.

Large spreading shrub, 1.8-5.4 m. tall, strongly armed with horizontal spines 5 cm. long; young parts red-scurfy. Leaves appearing after the flowers, spathulate, tip rounded, coriaceous dark green, velvety above, densely white felted beneath; nerves 10 pairs elevate beneath, 3.2 long, 2 cm. wide. Flowers on short thick peduncles. Bracts ovate red hairy, a cup-shaped circle of connate bracts below the flowers. Calyx cylindric, teeth 8, wooly and gummy, 15 mm. long. Corolla white, densely hairy, lobes 8, oblong obtuse, glabrous on inside, 2.5 cm. long. Stamens 8. Fruit 7.5 cm. through, globose, brown velvety, crowned by calyx-tube.

Distribution: Tenasserim, Malay Peninsula.—Annam, Siam, Java.

The fruit is used as a hair tonic.

Indo China: Gang trang, Lo vieng—.

GARDENIA Ellis.

Shrubs rarely trees, armed or not. Leaves opposite, rarely 3-nately whorled; stipules intrapetiolar, often connate. Flowers often large, terminal or axillary, solitary, fascicled, or rarely cymose,

sometimes dimorphic and polygamous. Calyx-tube ovoid or obconic; limb tubular or dilated, variously cleft or lobed. Corolla various; lobes 5-12, twisted in bud. Stamens as many as the corolla-lobes, inserted in the throat of the corolla; anthers sessile or subsessile, linear, included. Ovary 1-celled; ovules numerous, 2-seriate, on 2-6 parietal placentæ; style thick; stigma large, club-shaped or fusiform, usually 2-fid. Fruit often large, ovoid, ellipsoid or globose, coriaceous or fleshy and irregularly bursting, or with a hard bony endocarp which sometimes splits along the placental sutures. Seeds many, imbedded in the placentæ, compressed; testa thin; embryo small, in horny albumen.—Species 80.—Palæotropics.

A. Unarmed shrubs. Flowers large axillary, solitary
  1. Leaves short-petioled, elliptic, obtuse or subacute, shining, many-nerved .... 1. *G. lucida.*
  2. Leaves sessile or subsessile, obovate, acute or obtuse .... 2. *G. gummifera.*
  3. Leaves elliptic-ovate, narrowed at both ends, usually acute, shining, short-petioled .... 5. *G. florida.*

B. Shrubs, armed or unarmed. Flowers dimorphic monoecious or dioecious
  1. An unarmed tree .... 3. *G. turgida.*
  2. A spiny shrub .... 4. *G. campanulata.*

The fruit is cathartic and anthelmintic.

The following species are used medicinally in Japan, China, Indo China—*G. grandiflora* Lour., *G. jasminoides* Ellis.—; in Cambodia— *G. angkorensis* Pitard—; in the Gold Coast, Guinea— *G. thunbergia* Linn. fil—; in South Africa— *G. globosa* Hochst., *G. rothmannia* Linn., *G. thunbergia* Linn. fil.—.

1. **Gardenia lucida** Roxb. Hort. Beng. (1814) 15; Wight Ic. t. 575,—PLATE 497.

A large glabrous shrub or small tree reaching 6-7.5 m. high; bark smooth, grey; young shoots greyish green, smooth, resinous. Leaves 6.3-20 by 2.5-7.5 cm., elliptic-oblong, subacute or shortly acuminate, base narrowed into a short petiole; main nerves 20-25 pairs, slender, prominent beneath; petioles somewhat obscure, about 3 mm. long; stipules large, broadly ovate, acute, membranous. Flowers fragrant, axillary, solitary, from the axils of the uppermost leaves near the ends of the branches; pedicels 6-13 mm. long.

Calyx 2 cm. long, pubescent or tomentose; teeth 1 cm. long, erect, lanceolate, subulate. Corolla large, at first pure white, soon turning yellow; tube 3.2-5 cm. long, slender, puberulous outside; lobes 5, obovate, obtuse, 3.2 by 2 cm., spreading, veined, glabrous. Fruit ellipsoid or globose, 2-2.5 cm. diam., smooth, marked with longitudinal lines, crowned by the persistent calyx-limb; pericarp thick, woody; placentæ 2. The flowers open in the evening, soon turn from white to yellow and die.

Distribution: Burma, Chittagong, Konkan, S. M. Country, N. Kanara, all dry districts of Madras Presidency.

The gum has a hot, sharp, pungent taste; increases the appetite; astringent to the bowels; relieves the pains of bronchitis and vomiting; relieves constipation (Ayurveda).

The gum is commonly used in cutaneous diseases and to keep off flies and worms.

Bijeragogarh: Papar—; *Bombay:* Decamali—; *Canarese:* Bikke, Dikkamalli—; *Central Provinces:* Kokkita, Kondamanga, Kuru, Tettamanga—; *English:* White Emetic Nut—; *Gujerati:* Dekamari, Dikamali—; *Hindi:* Dekamari, Dikamali—; *Kathiawar:* Malan, Malati—; *Konkani:* Dikamali—; *Koya:* Karangi—; *Marathi:* Dekamari, Dikamali—; *Porebunder:* Bhaladi, Bhalan—; *Sanskrit:* Hingu, Hingunadika, Jantuka, Nadihingu, Palashakhya, Pinda, Pindavha, Ramathi, Shivadika, Suvirya, Vanshapatri, Venupatri—; *Tamil:* Kambil, Kumbai, Tikkamalli—; *Telugu:* Bikki, Erubikki, Karinguva, Sinnakaringuva, Tellakaringuva, Tellamanga, Yerrabikki—; *Tulu:* Dikkamalli—.

2. **Gardenia gummifera** Linn. f. Suppl. (1781) 164; Wight Ic. t. 576.—PLATE 498.

A shrub about 1.8 m. high, glabrous or nearly so, unarmed; buds resinous. Leaves sessile or nearly so, 4.5-7 by 2-2.5 cm., elliptic-oblong, or obovate-oblong, obtuse or subacute, glabrous, shining, base obtuse, acute, or sometimes cordate; main nerves 12-18 pairs; stipules connate truncate or mucronate. Flowers not odourous, subsessile, 1-3 together. Calyx 1 cm. long, densely pubescent; teeth triangular, 2-3 mm. long. Corolla at first white, soon changing to

yellow; tube pubescent outside, 3.2-3.8 cm. long; lobes oblong, obtuse, 2.5-3.2 by 1.3-1.6 cm. Fruit 2.5-3.8 cm. long, oblong or ellipsoid, with numerous longitudinal elevated lines and with a stout beak, smooth; pericarp thin; placentæ 4-5.

Distribution: S. M. Country, N. Kanara, N. Circars, Deccan and Carnatic to the foot of the N. Ghats of Madras Presidency, Malabar Coast.

The medicinal properties are the same as those of *G. lucida* (Ayurveda).

The gum obtained from this plant is used internally in dyspepsia accompanied by flatulence. In veterinary medicine, it is employed to keep off flies from sores.

The drug is considered antispasmodic and carminative, and, when applied externally, antiseptic and stimulating. Said to be a successful anthelmintic in cases of round worm.

The powdered gum-resin is said to have diaphoretic and expectorant properties, used internally in guinea-worm.

Used as an astringent for cleansing foul ulcers, and for allaying irritation of the gums and checking diarrhœa during teething of children.

Bhumij: Bruru—; *Bombay:* Dikamali—; *Canarese:* Bhickygidda, Bikke, Dickygidda, Dikkamalli, Kambimena, Sittubikke, Yerbhicky—; *Central Provinces:* Kamarri, Karmarri, Papra—; *Gujerati:* Dikamalli, Kamarri Karmari—; *Hasada:* Bururing—; *Hindi:* Dikamli—; *Khond:* Kanga—; *Kolami:* Barui, Baruri—; *Koya:* Garagamuti—; *Lambadi:* Dikambli—; *Naguri:* Bururi—; *Sadani:* Dururi—; *Tamil:* Kambil, Sinnakkambil, Sirukkambil, Tikkamalli—; *Telugu:* Bikki, Garaga, Karinguva, Manjibikki, Sinnabikki, Sirubikki, Sittamatta, Sittimitta—; *Uriya:* Bryddhikoli, Gurudu—.

3. **Gardenia turgida** Roxb. Hort. Beng. (1814) 15; Fl. Ind. I (1832) 711.—Plate 499.

A small deciduous tree. Branches rigid, stout armed with strong axillary straight often leaf-bearing spines. Bark smooth, yellowish. Leaves variable, 2.5-10 cm. long, elliptic obovate or orbicular, obtuse or acute, coriaceous, shining above, glabrous pubescent or tomentose

beneath, narrowed into a short petiole, pale when dry. Flowers dimorphic, the males fascicled, the females solitary. Calyx of male flowers 4 mm. long, its mouth wide and truncate; of the female flowers 8-20 mm. long, the limb shortly campanulate; teeth oblong or subspathulate, foliaceous. Corolla salver-shaped, white, fragrant; 8-13 mm. long, subcylindric; limb 2.5 cm. across. Fruit 2.5-7.5 cm. diam., ovoid or globose, not beaked, smooth; pericarp thick, endocarp woody, shining inside; placentæ 5-6.

Distribution: Upper Gangetic Plain, base of Himalaya from Garhwal to Bhutan, Bihar, Chota Nagpur, S. M. Country, M. Kanara, all dry deciduous forests of Madras Presidency.

A preparation from the root is employed by the Santals as a remedy for indigestion in children (Campbell).

The crushed roots form a lather with water. In severe headache the Mundas of Chota Nagpur put this lather on the top of the head, and then beat the head gently with the palm of the hand.

Forster and Narainrao have isolated about 40 per cent of d-mannitol from the dried exudation (*Journn. Chem. Soc.;* 1925).

Bhil: Phetrak—; *Burma:* Thaminsani—; *Canarese:* Bengeri, Bongeri, Magge—; *Central Provinces:* Karhar, Khemra—; *Gond:* Panjra, Pendra—; *Hindi:* Ghurga, Ghurgia, Karamba, Khuriari, Khurrur, Mhaner, Thanella—; *Kolami:* Duduri, Karhar—; *Koya:* Tellaguma—; *Kumaon:* Thanera—; *Kurku:* Phurpata—; *Malayalam:* Kharkar, Malankara—; *Marathi:* Khurphendra, Pendra, Pendri, Phanda, Phetra—; *Merwara:* Karumba—; *Mundari:* Dhudri, Dhuduri, Dhurri, Dhururi—; *North-Western Provinces:* Thanella—; *Rajputana:* Karumba—; *Santal:* Dandukit, Duduki—; *Tamil:* Malangarai, Nanjundam—; *Telugu:* Kokkita, Mullukokkita, Tellakokkita, Tuddumanga, Vettibikki, Yerrabikki—; *Uriya:* Bomonia, Darobokrisho, Guruna—.

4. **Gardenia campanulata** Roxb. Hort. Beng. (1814) 15; Fl. Ind. I (1832) 710; Wight Ic. t. 578.—PLATE 500.

A shrub, 4.5-6 m. with membranous elliptic-obovate or oblanceolate leaves, 3.8-7.5 cm. narrowed, into the short petiole, glabrous. Male flowers fascicled under 1.3 cm. diam., female flowers 7.5-13

mm. with very short lobes, both campanulate. Fruit 2-3.2 cm. diam., ellipsoid or subglobose.

Distribution: Foot of the Sikkim Himalaya, Assam, Sylhet, Chittagong, Pegu, Bihar.

The fruit is used as a cathartic and anthelmintic (Roxburgh).

Burma: Hsaythanpaya—.

5. **Gardenia florida** Linn. Sp. Pl. ed. II, 305.

A glabrous, unarmed shrub usually about 1 m. high. Leaves elliptic ovate, narrowed at both ends, usually acute, shining, short-petioled, 2-6 cm. long. Flowers large, very fragrant, solitary in the upper axils. Calyx green, the tube funnel-shaped, about 1.5 cm. long, 5- angled or -winged, the lobes linear, about as long as the tube. Corolla usually double, white, soon turning yellowish, about 5 cm. long, 5-7 cm. wide.

Distribution: A native of Japan and China.—Often cultivated in Indian gardens.

The plant is considered antispasmodic, antiperiodic, cathartic, and anthelmintic. It is used externally as an antiseptic.

The root is prescribed in dyspepsia and in nervous disorders.

In the Konkan, the root is rubbed into a paste with water, and applied to the top of the head as a remedy for headache during pregnancy; it is also given internally for hysteria, either alone or in combination.

Burma: Thongsinpan—; *English:* Cape Jesmine—; *French:* Jasmin du Cap, Jasmin fleuri, Jasmin de Malabar—; *Hindi:* Gandharaj—; *Sanskrit:* Gandharaja—; *Uriya:* Gonddhorajo—.

Plectronia Linn.

Shrubs (sometimes small trees), armed or unarmed, sometimes scandent. Leaves opposite, shortly petiolate; stipules connate. Flowers axillary, fascicled, or in corymbose peduncled cymes, small, white or green. Calyx-tube short, obconic, turbinate or hemispheric; limb very short, truncate or 4-5-toothed. Corolla-tube infundibuliform, campanulate, globose or urceolate, usually with a ring of deflexed hairs within; lobes 4-5, at length reflexed, valvate in bud.

Naikinna, Nakkareni, Nakkena, Nakkini, Nallabalasu, Naumpapala, Niralli—; *Uriya:* Dalosingi, Gajorani, Kori, Tola, Prithugujorani—.

2. **Plectronia parviflora** Bedd. For. Man. in Fl. Sylv. p. CXXXIV—5 (1874).—*Canthium parviflorum* Lam. Encycl. Meth I (1783) 602; Roxb. Corom. Pl. t. 51.—PLATE 502, right hand figure (under *Canthium parviflorum*).

A shrub usually rigid, but sometimes subscandent in hedges; branches many, with opposite supra-axillary nearly horizontal sharp straight spines 2-3.8 cm. long, the spines sometimes wanting when the branches are less rigid. Leaves 2-3.8 by 1.3-2.5 cm., often fascicled on the young shoots, ovate, obovate or suborbicular, obtuse, glabrous, green above, whitish beneath, base cuneate; main nerves 4-6 pairs; petioles 2.5-6 mm. long, slender, stipules shortly triangular at the base, with a long subulate point. Flowers 4-merous, small, yellowish, in many-flowered usually peduncled cymes which are sometimes fascicled; peduncles and pedicels slender, of variable length. Calyx 1.25-1.5 mm. long; lobes 4, triangular, acute, 0.85 mm. long. Corolla 4 mm. long; tube inflated; lobes as long as the tube, ovate, acute. Style glabrous; stigma large, globose. Drupe 9.5-11 mm. long, about 4.5 mm. broad, oblong-ellipsoid, compressed, didymous, areolate at the apex, yellow when ripe, edible.

Distribution: Bombay Presidency: Deccan, S. M. Country, N. Kanara, Madras Presidency. In dry plains districts.

A decoction of the edible leaves, as well as the root of this plant, is prescribed in certain stages of flux, and the last is supposed to have anthelmintic qualities, though neither have much sensible taste or smell.

In Indo China, the bark and the young branches are given in dysentery.

Bombay: Kirni—; *Canarese:* Kake, Kare, Karemullu, Kari, Kirani, Mullumusta, Ollepode—; *Indo China:* Gan cuom, Gang com, Gang son, Gan vang—; *Konkani:* Kayili—; *Lambadi:* Lodhija—; *Malayalam:* Kantankara, Niruri, Serukara—; *Marathi:* Kadbar, Kirma—; *Philippines:* Culiacdaga—; *Sanskrit:* Gangeruki,

Nagabala—; *Sinhalese:* Kara—; *Tamil:* Kadalattal, Karai, Kudiram, Nallakkarai, Sengarai—; *Telugu:* Balusu, Sinnabalusu—; *Tulu:* Kakkendel—; *Uriya:* Tutidi—.

VANGUERIA Juss.

Erect shrubs or small trees, armed or unarmed. Leaves petioled; stipules connate. Flowers small, white or greenish, in axillary fascicles or peduncled cymes or in lateral panicles below the leaves. Calyx-tube short, turbinate or globose; limb spreading; lobes 4-6, sometimes more. Corolla-tube cylindric or globose, with a ring of silky deflexed hairs within; lobes 4-6, lanceolate, acute, at length reflexed. Stamens as many as the corolla-lobes, filaments short or 0; anthers oblong. Ovary 3-6- but usually 5- celled; ovules solitary in each cell, pendulous; style thick; stigma large, capitate, ridged. Fruit a dry or fleshy drupe, with 3-5 pyrenes, the apex areolate. Seeds in each pyrene solitary; testa membranous; albumen fleshy; cotyledons small with an elongated superior radicle.—Species 40.—Tropical Asia, Africa, Madagascar.

V. dalzielii Hutch. is used medicinally in Nigeria and Sudan; *V. emirnensis* Bak. and *V. madagascariensis* J. F. Gmelin in Madagascar; *V. infausta* Burch. and *V. lasiantha* Sond. in South Africa.

1. **Vangueria spinosa** Roxb. Hort. Beng. (1814) 15.—PLATE 502, left hand figure.

A large shrub or small tree with straight opposite (sometimes 3-nate) sharp spines 1.3-3.8 cm. long; bark dark coloured, nearly smooth. Leaves 5-12.5 by 3.2-7 cm., membranous, elliptic-oblong, acuminate, glabrous, base shortly cuneate; main nerves 6-8 pairs; petioles 6-25 mm. long; stipules 8 mm. long, glabrous, broadly triangular at the base, with a slender subulate acumination about 4-5 mm. long. Flowers greenish white, in peduncled cymes from the old scars below the leaves; peduncles usually short; pedicels slender; buds acute, somewhat mitre-shaped. Calyx 2.5 mm. long, glabrous; tube cup-shaped, ribbed, rugose; teeth 5, somewhat scarious, 0.85 mm. long, distant, triangular, very acute. Corolla 8 mm. long; tube

very broad, glabrous outside, the throat densely hairy within; lobes 5, ovate-lanceolate, acute, equalling the tube. Fruit about 2.5 cm. diam., on slender pedicels, globose, smooth, yellowish when ripe, edible; pyrenes 4-5, woody, smooth.

Distribution: N. Bengal, Burma, Pegu, Konkan, Deccan, S. M. Country, N. Kanara, most plains districts of Madras Presidency.

It is the Pindu and Pinditaka of Sanskrit writers, who consider the fruit to be medicinal, and describe it as strengthening, cooling, and an expellant of phlegm and bile.

At Lakhimpur in Assam, the powdered leaves are said to be good for diphtheria (Carter).

The stem in combination with other drugs is recommended for the treatment of snake-bite and scorpion-sting (Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Mainphal, Muduna, Muyna, Muyuna—; *Bombay:* Alu, Atu—; *Burma:* Hsaymakyi—; *Canarese:* Achuramullu, Gobergally, Gundkare, Karimullu, Maggare, Mangase, Mullakare—; *Central Provinces:* Gel, Mainphal—; *Hindi:* Moina, Muduna, Muyuna—; *Lakhimpur:* Katkara, Kutkura—; *Marathi:* Alu, Halawni, Huloo—; *Mundari:* Kantaara, Kataiara, Seraliara, Sirliara—; *Sadani:* Sarlasag—; *Sanskrit:* Pindi, Pinditaka, Pindituka, Pindu—; *Tagalog:* Madondon, Malaasis—; *Tamil:* Manakkarai—; *Telugu:* Segagadda, Veliki, Visikilamu—; *Uriya:* Monono, Montaphoo—.

Ixora Linn.

Shrubs or small trees usually glabrous. Leaves opposite (rarely 3-nately verticelled); stipules interpetiolar. Flowers usually 4-merous, in terminal 3-chotomously branched often corymbose cymes, 2-bracteolate. Calyx-tube ovoid; limb short, 4- (rarely 5-) toothed, persistent. Corolla-tube long, very slender; lobes 4 (rarely 5), usually shorter than the tube, spreading, twisted in bud. Stamens 4 (rarely 5), on the mouth of the corolla; filaments short or 0; anthers slender, often with an apiculate tip. Ovary 2-celled; ovules solitary in each cell, peltately attached to the septum; style filiform; stigma

slender, fusiform, 2-branched, the branches rarely persistently connate. Fruit globose or subdidymous, with 2 plano-convex or ventrally concave coriaceous pyrenes. Seeds peltate; testa membranous; albumen horny; cotyledons flat, thin; radicle inferior.—Species 200. —Tropics.

A. Calyx-teeth shorter than the ovary
  1. Leaves and inflorescence turning black in drying .... 4. *I. nigricans.*
  2. Leaves and inflorescence not turning black in drying
    a. Flowers white
      Corolla-tube exceeding 6 mm. long. Flower-buds ellipsoid .... 1. *I. parviflora.*
    b. Flowers bright scarlet
      A shrub. Corolla-tube 3.8 cm. long .... 2, *I. coccinea.*
B. Calyx-teeth equalling or shorter than the ovary .... 3. *I. cuneifolia.*

The root is aperient, deobstruent, and diuretic; the wood is febrifuge.

The following species are used medicinally in China—*I. chinensis* Lam.—; in Indo China—*I. coccinea* Linn., *I. cuneifolia* Roxb., *I. nigricans* R. Br.—; in Cambodia—*I. flavescens* Pierre var. *Cambodiana* Pitard—; in the Philippine Islands—*I. coccinea* Linn.—; in La Reunion—*I. borbonica* Cordem—.

1. **Ixora parviflora** Vahl Symb. III (1724) 11, t. 52; Wight Ic. t. 711; Bedd. Fl. t. 222.—PLATE 503.

A small much-branched evergreen tree; bark thick, reddish brown; branchlets somewhat compressed, glabrous. Leaves 7.5-12.5 by 3.8-5.7 cm., very coriaceous and hard, reticulately veined, oblong or elliptic, obtuse, glabrous and shining, pale when dry, base usually rounded, sometimes cordate; main lateral nerves 8-10 pairs, slender, faint; petioles scarcely 3 mm. long, rugose; stipules 5 mm. long, broadly ovate, with a cuspidate point about 3 mm. long. Flowers whoite, odourous, small and very numerous, in subglobose clusters, in sessile cymes brachiate with 3-5 pairs of short branches; pedicels very short or 0; the lowest bracts like the stipules, the upper lanceolate-subulate united by a stipule-like membrane across the nodes; bracteoles minute, subulate; flower-buds ellipsoid. Calyx 1.5 mm. long, ovoid-oblong; teeth 4, minute, not more than 0.5 mm. long, triangnlar, subacute. Corolla-tube 8-11 mm. long, without hairs in

the mouth; lobes 4, linear-oblong, obtuse, 4.5-6 by 1.25 mm. Style densely clothed with white hairs; branches of the stigma elliptic-females when the urine is high coloured.

Distribution: Upper Gangetic Plain, Bengal, Chittagong, Burma, Nicobars, Central Provinces, Bombay Presidency, in almost all districts of Madras Presidency, Ceylon.

The Santals employ the root or fruit as a medicine to be given to females when the urine is high colored.

Bengal: Rangan—; *Bombay:* Kurat, Lokandi, Narkurat, Raikuri—; *Burma:* Pansayeip—; *Canarese:* Goravi, Gorvi, Hennu, Hennugoravi, Kansuragi, Suragi—; *Ceylon:* Karankuttai, Punkirai—; *Chota Nagpur:* Lohajangia—; *Coorg:* Goravi—; *English:* Torch Tree—; *Gond:* Disti, Kori—; *Gujerati:* Nevari—; *Hindi:* Kotagandhal, Makrichijhar, Nevari—; *Khond:* Kuruperi, Tutu, Tutukurapu—; *Kolami:* Pete—; *Konkani:* Kura, Lokonddkati—; *Marathi:* Khura, Kura, Kurat, Lokandi, Nevali, Raikora, Undi—; *Mundari:* Coladaru—; *Porebunder:* Nevari—; *Reddi:* Geddachida—; *Sadani:* Lohajanghia—; *Sanskrit:* Nevali—; *Santal:* Merommet—; *Sinhalese:* Maharatambala—; *Tamil:* Koran, Korivi, Sulundu—; *Telugu:* Gorivi, Kori, Koringi, Korivi, Korivipala, Mabbukorivi, Puttupala, Teddupala—; *Tulu:* Korise—; *Uriya:* Kilakrya, Krya, Telokrya—.

2. **Ixora coccinea** Linn. Sp. Pl. (1753) 110; Wight Ic. t. 153.—*I. Bandhuca* Roxb. Hort. Beng. (1814) 10.—Plate 504.

A glabrous shrub 0.6-0.9 m. high. Leaves 5-10 by 3.2-6.3 cm., coriaceous, pale when dry, sessile or nearly so, oblong, obtuse (rarely acute), apiculate, base rounded or subcordate; main nerves 8-12 pairs, slender; stipules with a long rigid cuspidate point. Flowers numerous, bright scarlet, in dense sessile or very shortly peduncled corymbiform cymes; pedicels very short, glabrous or puberulous; bracts and bracteoles small, lanceolate-subulate, acute; buds fusiform, very acute. Calyx 2.5 mm. long, glabrous; teeth 1.25 mm. long, triangular, acute. Corolla-tube reaching 3.8 cm. long, slender, without hairs in the mouth; lobes 13 by 4-5 mm., elliptic-oblong, subacute. Fruit globose, size of a pea, smooth, fleshy, crowned with the calyx-teeth, purple when ripe. Seeds deeply ventrally concave.

Distribution: Indigenous in the W. Peninsula, Ceylon; cultivated throughout India.

In dysentery, 2 tolas of the flowers, fried in ghi (melted butter), are rubbed down with 4 gunjas each of Cumin and Nagkesar, and made into a bolus with butter and sugarcandy, and administered twice a day.

The flowers are also given in dysmenorrhœa.

Bengal: Rajana, Rangan—; *Burma:* Pansayeik—; *Canarese:* Guddedasal, Kepala, Kisukare—; *English:* Flame of the Woods—; *Indo China:* Bong trang do, Don do, Mau don—; *Konkani:* Patkali—; *Madras:* Tachi—; *Malayalam:* Shekki, Shetti, Techi—; *Marathi:* Bakora, Pankul, Pendgul, Pendkul—; *Sanskrit:* Bandhuka, Bandhujivaka, Parali, Raktaka—; *Sinhalese:* Ratambala—; *Tagalog:* Santan—; *Tamil:* Kullai, Sedaram, Setti, Sinduram, Vedji—; *Telugu:* Bandhujivamu, Bandhujivakamu, Bandhukamu, Koranam, Korani, Mankana, Manmadhabana—; *Uriya:* Bondhuko, Romoniphulo—; *Visayan:* Tangpupo—.

3. **Ixora cuneifolia** Roxb. Hort, Beng. (1814) 10.

An evergreen shrub, all parts glabrous or rarely the young shoots minutely puberulous. Stipules broadly ovate, shortly acuminate, glabrous or puberulous. Leaves oblong to oblong-lanceolate or rarely ovate-oblong, rounded or obtuse at the base, on a 6-10 mm. long petiole, shortly acuminate, 10-18 cm. long, entire, pergamaceous, glabrous or minutely puberulous beneath. Flowers rather small, but conspicuous, pure white, on very short puberulous pedicels, cymulose, and forming a short-peduncled or sometimes sessile trichotomously brachiate, shortly pubescent terminal thyrsoid panicle supported by a pair of stipule-like, ovate, acuminate, small leaflets at the first branching; bracts lanceolate, acuminate to subulate, along with the floral stipules more or less puberulous; calyx more than 1 mm. long, glabrous, the teeth lanceolate, nearly as long as the tube, corolla glabrous, the tube slender, about 1.3 cm. long or rarely longer, the lobes elliptically oblong, $1/3 - 1/4$ as long as the tube. Berries obovoid, the size of a large pea, crowned by the small calyx-limb, smooth, red.

Distribution: Assam, Burma.

In Indo China, an infusion of the leaves is given in fevers.

Indo China: Tien Ko—.

4. **Ixora nigricans** Br. in Wall, Cat. (1828) 6154; Wight Ic. t. 318.

A large evergreen shrub or small tree; young branches, leaves, and inflorescence turning black in drying. Leaves 10-15 by 3.8-6.3 cm., membranous, elliptic-oblong, elliptic-lanceolate, or (sometimes) elliptic-obovate, acute or shortly acuminate, glabrous, base acute or rounded; main nerves 12-15 pairs, slender, arched; petioles 6-10 mm. long; stipules shortly triangular at base, cuspidate with a long stiff bristle. Flowers white, odorous, in sessile or peduncled brachiate usually glabrous cymes which are broader than long; bracts at the base of the main peduncles foliaceous, 1 cm. long, lanceolate, cuspidate, those beneath the branches of the cyme subulate, bracteoles minute, subulate; buds very narrowly fusiform, not much broader than the corolla-tube. Calyx glabrous, 2.5 mm. long; teeth 1 mm. long, triangular, acute, subfleshy. Corolla-tube 1 cm. long, slender, glabrous, without hairs in the mouth; lobes 4.5 mm. by 2.5 mm., oblong, subacute, glabrous. Style glabrous. Stigma-branches recurved. Fruit globose or didymous, size of a pea. Seeds plano-convex, rugose on the back.

Distribution: E. and W. Peninsula, Burma.—Malay Archipelago.

The leaves are considered antidysenteric in Indo China.

Burma: Sawkan—; *Canarese:* Adayala—; *Indo China:* Bong trang trang—; *Marathi:* Katkura, Lokhandi—; *Tamil:* Mashagani, Udappu—.

PAVETTA Linn.

Shrubs or small trees. Leaves opposite, petiolate, usually membranous; stipules intrapetiolar, usually connate into a lax sheath, deciduous. Flowers in axillary or terminal 3-chotomously branched usually many-flowered corymbose cymes, white or greenish, bracteolate. Calyx-tube ovoid, turbinate or campanulate; lobes 4 (very rarely 5), short or long. Corolla hypocrateriform; tube slender, cylindric; throat naked or bearded; lobes 4 (very rarely 5), frequently

longer than the tube, twisted. Stamens 4 (very rarely 5), inserted in the throat or mouth of the corolla; filaments short or long, or 0. Ovary 2-celled; ovules solitary in each cell, attached to the middle of the septum, amphitropous, the placenta fleshy, often tumid; style long, much exserted; stigma fusiform or somewhat clavate, undivided or 2-dentate. Berry pisiform, fleshy, with 2 pyrenes which are convex on the back and concave on the face. Seeds conform to the pyrenes; testa membranous; albumen horny; cotyledons foliaceous; radicle inferior.—Species 90.—Palæotropics.

P. indica Linn. is used medicinally in Indo China and La Reunion; *P. canescens* DC. in South Africa.

1. **Pavetta indica** Linn. Sp. Pl. (1753) 110; Wight Ic. t. 148.—*Ixora pavetta* Roxb. Fl. Ind. I, 385.—Plate 505.

A stout bushy shrub 0.6-1.2 m. high; bark thin, smooth, yellowish; young branches terete, glabrous. Leaves 7.5-15 by 2.5-6.3 cm., membranous, variable in shape and size, elliptic-oblong or elliptic-lanceolate, sometimes obovate-oblong, obtuse, acute or acuminate, glabrous on both sides, base tapering; main nerves 8-10 pairs; petioles 6-13 mm. long; stipules connate, triangular, acute, thin, deciduous. Flowers white, odourous, in terminal sessile corymbose pubescent cymes; pedicels 4-6 mm. long, densely pubescent; bracts broad, membranous, the lower cupular; buds oblong-clavate. Calyx densely pubescent, 3 mm. long; tube narrowly campanulate; teeth 1.25 mm. long, triangular, acute, slightly reflexed at the tip. Corolla-tube 13 mm. long; lobes 6-8 by 2.5 mm., linear-oblong, subacute. Style white, glabrous or nearly so; stigma green, narrowly clavate, puberulous. Fruit 6-14 mm. diam., globose, black, smooth.

Distribution: Throughout India, Ceylon, Malay Peninsula.—Malay Archipelago, S. China, N. Australia.

The root is bitter and aperient. It is commonly prescribed in visceral obstructions; given in powder to children, the dose is about a drachm or more.

The root is pulverised and mixed with ginger and rice water, and given in dropsy.

Boiled in water, a fomentation is made from the leaves for hæmorrhoidal pains.

In Indo China, an infusion of the wood is given as a cure for rheumatism.

Bengal: Kukurachura, Jui—; *Bombay:* Papat—; *Burma:* Hmitgyin, Hmitnaban, Sebaunggyan—; *Canarese:* Nitile, Pappadi, Pavate, Pavati, Sulebottu—; *Dehra Dun:* Angari—; *English:* Indian Pellet Shrub—; *French:* Bois de Cranganore, Bois de Crangonor, Bois de Crangor, Bois de pintade, Pavette des Indes—; *Hindi:* Kankra, Karnikara, Kathachampa, Papari—; *Indo China:* Dot sanh, Gioi, Gioi sanh, Kho som kao, Ko som kang—; *Kharwar:* Buri—; *Kolami:* Sikerup, Sikriba—; *Koya:* Tellapapata—; *Lepcha:* Sundok—; *Malay:* Pecha priok putih, Surungko—; *Malayalam:* Mallikamuti, Pavatta—; *Marathi:* Papadi—; *Nepal:* Kangyaphul—; *North-Western Provinces:* Angari, Padera, Puldu—; *Sanskrit:* Kakachedi, Papata, Tiriakphala—; *Saora:* Kuvaboyi—; *Santal:* Budhigasit, Budhitibai—; *Sinhalese:* Pavetta, Pawatta—; *Tamil:* Araniya, Karanai, Kattukka-ranai, Pavattai—; *Telugu:* Duyipapata, Kondapapata, Lakkapapidi, Manjipapata, Nallapapidi, Namapapata, Nunepapata, Papatakommi, Papidi, Tapra—; *Tulu:* Pavate—; *Uriya:* Boniki, Katophingi, Pani-phingi, Phingi, Sua—.

Coffea Linn.

Shrubs, branchlets compressed. Leaves opposite, rarely in threes; stipules broad. Flowers in axillary fascicles or cymes or solitary, white or yellowish, often scented; bracteoles often connate. Calyx-tube short; limb short, often glandular, persistent. Corolla-tube short or long; lobes 4-7, spreading, twisted in bud. Anthers 4-7, sessile on the corolla-tube or throat, narrow, often recurved and twisted. Ovary 2-celled; style filiform, smooth, branches linear or subulate; ovules 1, peltately attached to the septum in each cell. Drupe with 2 plano-convex or ventrally concave coriaceous or cartila-ginous pyrenes. Seeds plano-convex, concave or grooved ventrally, albumen horny; embryo short, towards the base of the seed curved,

cotyledons thin cordate, radicle inferior.—Species 45.—Palæotropics, especially Africa.

C. liberica Hiern. is used medicinally in the Gold Coast.

The seeds of *C. arabica* Linn. are officinal in Spain and Portugal.

1. **Coffea arabica** Linn. Sp. Pl. (1753) 172; Wight Ic. t. 53.

A glabrous shrub or small tree. Leaves 12.5-18 cm. long, opposite, oblong, acuminate, narrowed into short petiole; main lateral nerves 6-10 pairs, joined by intramarginal veins, and slender parallel reticulate veins. Flowers numerous, in axillary fascicles. Corolla funnel-shaped, lobes oblong, as long as tube. Filaments $1/3 - 1/2$ the length of anthers. Berry fleshy, purple when ripe.

Distribution: Indigenous in Abyssinia and the Sudan.—Cultivated in India.

In Guiana, an infusion of the unripe seeds is given in migraine, fever, and gout.

MORINDA Linn.

Shrubs or trees; branches terete or obscurely 4-gonous. Leaves opposite, rarely 3-nately verticillate, usually membranous; stipules connate, sheathing. Flowers in axillary or terminal simple, panicled, or umbellate heads, white, more or less connate by the calyces. Calyx-tube urceolate or hemispheric; limb short, truncate or obscurely toothed, persistent. Corolla-tube short or long; lobes 4-7, coriaceous, valvate in bud. Stamens 4-7; filaments short; anthers linear or oblong. Ovary 2- or (sometimes imperfectly) 4-celled; ovules solitary, ascending from towards the base of the septum in each cell; style slender, with 2 short or long linear branches. Fruit a syncarpium formed by the succulent enlarged calyces enclosing many cartilaginous or bony 1-seeded pyrenes which sometimes cohere into a 2-4-celled putamen, rarely of nearly free drupes. Seeds obovoid or reniform; testa membranous; albumen fleshy or horny; embryo terete; radicle inferior.—Species 45.—Tropics.

A. Corolla 5-7-merous; tube long
   1. Leaves usually 15-25 cm. long, broadly elliptic-acuminate, acute or obtuse .... 2. *M. citrifolia.*
   2. Leaves usually 10-20 cm. long, broadly or narrowly elliptic-acute at both ends .... 1. *M. tinctoria.*
B. Corolla 4, rarely 5-merous; tube short, not 6 mm. .... 3. *M. umbellata.*

Leaves deobstruent.

The following species are used medicinally in Indo China—*M. citrifolia* Linn., *M. umbellata* Linn.—; in the Philippine Islands, the Gold Coast, Sudan, Guinea—*M. citrifolia* Linn.—; in Guiana—*M. tinctoria* Roxb.—.

1. **Morinda tinctoria** Roxb. Hort. Beng. (1814) 15.—*M. citrifolia* Bedd. Fl. Sylv. t. 220 (non Linn.).—PLATE 507, right hand figure.

A small or middle-sized tree, usually pubescent or tomentose, bark spongy, deeply cracked, greyish yellow. Leaves not shining, elliptic-obovate or lanceolate, blade 4-8, narrowed into petiole 1.3-2.5 cm. long. Peduncles solitary, axillary or leaf-opposed, frequently in short trichotomous panicles at the ends of the branchlets. Flowers scented, 5-merous, corolla usually tomentose outside, tube 1.3-2 cm. long, anthers exserted or included. Syncarpium 2 cm. diam.

Distribution: Upper and Lower Burma, Bengal, Bihar, Central Provinces, Deccan. S. M. Country, N. Kanara, Madras Presidency: S. Deccan and Carnatic to S. Travancore, westwards to the E. slopes of the Ghats.

The root is styptic, astringent to the bowels; dries boils; the infusion is tonic as a bath.—The stem has the same properties as the root; alexiteric (Yunani).

The root is used internally as an astringent (Irvine).

Arabic: Bakam—; *Assam:* Asukhat, Larnong—; *Bengal:* Ach, Auch, Darnaharidra—; *Bombay:* Ack, Ainshi, Al, Alladi, Alleri, Manjishta—; *Burma:* Nibase—; *Canarese:* Maddi, Molagu, Mulgal—; *Central Provinces:* Ach, Aich—; *Ceylon:* Manchavanna—; *French Guiana:* Royoc—; *Gujerati:* Al—; *Hindi:* Ach, Al—; *Khond:* Achu—; *Lambadi:* Alam—; *Malayalam:* Kattapitalavam, Mannanatti—; *Marathi:* Aseti, Nagkura—; *Mundari:* Salidaru—; *Persian:* Bakam—; *Porebunder:* Al—; *Sanskrit:* Achchhuka—; *Santal:* Bankatari, Chaili—; *Singapore:* Seinglaing—; *Sinhalese:* Ahu—; *Tamil:* Manjanatti, Manjanuna, Nuna—; *Telugu:* Bandamaddi, Maddi, Mogali, Molugu, Togaru, Togarumogali—; *Urdu:* Al—; *Uriya:* Achu, Achhuko, Ochyuta—.

2. **Morinda citrifolia** Linn. Sp. Pl. (1753) 176.—PLATE 506.

A small glabrous tree; trunk straight; bark smooth, yellowish white; branchlets obtusely 4-angled. Leaves 12.5-20 by 7.5-10 cm., broadly elliptic, acute, acuminate or obtuse, bright green, glabrous, shining, one of the pair next the peduncle often suppressed, base acute; main nerves 8-10 pairs, prominent; petioles 1.3 cm. long; stipules connate, short, broad, obtuse, membranous. Flowers white, in dense ovoid heads over 2.5 cm. long; peduncles solitary (rarely 2-3 together), usually leaf-opposed, 2.5-5 cm. long. Calyx-limb truncate. Corolla infundibuliform; tube 1 cm. long, the mouth hairy; lobes 5, lanceolate, acute. Stamens 5; filaments hairy; anthers about ½-exserted. Fruit white when ripe, smooth and glossy, about the size of a small egg; pyrenes ovoid, compressed, concave-convex, winged on the edge.

Distribution: Indigenous in the Darjeeling Terai and outer hills and on the Andamans and along the Konkan coast; cultivated largely in India and Burma.—China, Formosa.

The root is used as a cathartic.

The charred leaves made into a decoction with mustard are a favourite domestic remedy for infantile diarrhœa. The expressed juice of leaves is externally applied to gout, to relieve pain.

In Bombay, the leaves are used as a healing application to wounds and ulcers, and are administered internally as a tonic and febrifuge.

The unripe berries, charred and mixed with salt, are applied successfully to spongy gums.

In Indo China, the baked fruit is given in dysentery and asthma; it is also used as a deobstruent and emmenagogue.

In Guinea, a decoction of the roots is taken as an emetic and a laxative. An infusion of the leaves is considered emollient, sedative, cooling and stomachic. The boiled leaves are applied externally in fever and headache.

The essential oil from the leaves has been examined chemically (*Journ. Chem. Ind.;* Jan., 1910).

Bengal: Ach, Achhu, Aich, Huldikunj, Hurdi, Rouch—; *Bombay:* Aal, Abri, Ainshe, Alan, Aval, Bartundi, Nagakuda—; *Burma:*

Mhanbin, Niehpahsae, Nyahgyi, Yaiyae—; *Canarese:* Ainshi, Haladi-pavate, Maddi, Mulgul, Tagase—; *Central Provinces:* Al—; *Deccan:* Al—; *English: Indian* Mulberry—; *Fulah:* Garba, N'garba—; *Gujerati:* Al, Saraoji—; *Hindi:* Ach, Ak, Al, Barraal—; *Indo China:* Gaiu, Ngao, Nhau, Nhau nui—; *Konkani:* Aal—; *Lepcha:* Huldikung—; *Malay:* Mengkudu—; *Malayalam:* Kattapitalavam, Mannanatti, Mannapavatta—; *Malinke:* Ouanda—; *Marathi:* Aal, Al, Bartondi, Bartundi, Nagakunda, Surangi—; *Nepal:* Hardikath—; *New Caledonia:* Pemmy—; *Philippines:* Tombongaso—; *Sanskrit:* Achchhuka, Ashyuka—; *Seychelles:* Bois tortue—; *Sinhalese:* Ahugaha, Yahugaha—; *Soussou:* Bomboue—; *Sudan:* Uanda—; *Tagalog:* Bankudo, Nino—; *Tamil:* Manjatbavattai, Manjanatti, Nuna, Periyanuna, Seyal, Tunnavu, Vellainuna—; *Telugu:* Maddi, Mogali, Molugu, Mulugu, Togaru, Togarumogali—; *Tulu:* Takote—; *Uriya:* Achu, Gondhonagi—; *Visayan:* Bancudo, Bangcudo, Lino, Nino—.

3. **Morinda umbellata** Linn. Sp. Pl. (1753) 176.—Plate 507, left hand figure.

A scrambling shrub, climbing by very long, slender, sarmentose, divaricate branches, bark grey, striate, internodes very long, young parts puberulous. Leaves rather small, 5-10 cm., usually oblong-lanceolate, but sometimes broadly oval, tapering or acute at base, shortly acuminate, acute, glabrous, thin, dark green, venation finely reticulate, pellucid, petiole 6 mm., often twisted, stipules connate, sheathing, membranous, subpersistent. Flowers few together, heads small, less than 1.3 cm. diam., globose, stalked, peduncles 4-10 together in terminal umbels; calyx-limb short, perfectly truncate; corolla-tube very short, lobes 4, oblong-oval, much longer than the tube. Head of fruit small, about 8 mm. diam., lobulated, smooth, scarlet.

Distribution: Khasia Hills, Tenasserim, Malay Peninsula, Madras Presidency: E. Ghats, Vizagapatam, Deccan, Chingleput, N. Coimbatore, W. Ghats in all districts.

The leaves, in conjunction with certain aromatics, the Tamil doctors use in decoction, in cases of diarrhœa and dysentery, in the quantity of half a tea-cupful twice daily (Ainslie).

In Indo China, the root and the leaves are considered anti-dysenteric.

Bombay: Al—; *Canarese:* Maddibanne, Maddihambu, Maradarasina, Poppili—; *Indo China:* Day dat, Doc vo, Khua mac mah pa, Nghe ba—; *Sanskrit:* Daruharidra, Klibapushpa, Pitadaru—; *Sinhalese:* Kirrivalla, Mahakiriwel—; *Tamil:* Manjanattikkodi, Mattikkodi, Nuna, Sonainuna, Surinji, Tanakku, Tunavu—; *Telugu:* Madditige, Molugutige, Shiranji, Tella—.

PAEDERIA Linn.

Slender twining shrubs, fœtid when bruised; branches terete, flexious. Leaves opposite, rarely whorled in threes, petioled; stipules intrapetiolar, triangular, deciduous. Flowers in axillary and terminal 2-3-chotomously branched panicled cymes, bracteolate or not. Calyx-tube ovoid or turbinate; limb 4-5-toothed, persistent. Corolla tubular or funnel-shaped, pubescent, throat glabrous or villous; lobes 4-5, valvate with inflexed crisped margins, tip often 3-lobed. Anthers 4-5, subsessile in the corolla-tube, linear-oblong, obtuse. Ovary 2-celled; stigmas 2, capillary, twisted; ovules 1, basal, erect in each cell. Fruit globose or compressed; epicarp thin, fragile, shining, separating from 2 orbicular or oblong dorsally compressed membranous or coriaceous pyrenes. Seeds much dorsally compressed, testa thin adnate to the pyrene; cotyledons large cordate thin, radicle short inferior.—Species 40.—Tropics.

1. Fruit much compressed. Pyrenes separating from a filiform carpophore .... 1. *P. fœtida.*
2. Fruit subglobose. Pyrenes not separating from a filiform carpophore .... 2. *P. tomentosa.*

The whole plant is antiphlogistic and antirheumatic. Root emetic.

The following are used medicinally:—in China—*P. tomentosa* Blume.—; in Indo China—*P. foetida* Linn., *P. tomentosa* Blume.—.

1. **Paederia fœtida** Linn. Mant. I, 52.—PLATE 508.

Glabrous or puberulous. Leaves opposite ovate or lanceolate acute or cuspidate, base broad or narrowed, rather thin; nerves 4-5

pairs, fine; 5-7.5 cm. long, 2.5-3.8 cm. wide; petioles 1.3-3.8 cm. long. Stipules ovate-lanceolate, bifid. Panicle 15 cm. long, peduncle 7.5 cm. wide, spreading. Flowers violet, shortly pedicelled in slender trichotomous often scorpioid cymes. Calyx campanulate, acutely toothed. Corolla funnel-shaped, usually pubescent, lobes short. Fruit orbicular, wings pale, 1.1 cm. across.

Distribution: Central and E. Himalaya, up to 5,000 ft., to Calcutta and Malay Peninsula.—Siam, Malay Archipelago to Borneo.

The plant is bitter; indigestible, aphrodisiac, tonic; cures " vata " and " kapha ", inflammations, piles, fever; good for diseases of the eye and night blindness; laxative (Ayurveda).

1. *Edible variety:*—The plant is tonic, diuretic, emmenagogue, aphrodisiac; used in epistaxis; good for liver and stomach troubles, lumbago.—The juice of the root is useful in piles, pains in the chest and the liver, inflammation of the spleen.—The leaves are tonic, styptic, vulnerary; used in earache.

2. *Bitter variety:*—The plant is an emmenagogue, purgative, and styptic.—The seeds are alexipharmic; used in piles and leucoderma (Yunani).

The whole plant is regarded as a specific for rheumatic affections, in which it is administered both internally and externally.

The roots are used by the Hindoos as an emetic.

The decoction prepared of the leaves is considered wholesome and nutritive for the sick and convalescent.

The juice of the leaves is considered astringent and given to children when suffering from diarrhœa.

The fruit is used to blacken the teeth by Lepchas and Paharias; this, they say, is a specific against tooch-ache (Gamble).

Arabic: Bazraulkaras—; *Assam:* Bedolisutta—; *Bengal:* Gandha-bhadulia—; *Bombay:* Prasaram—; *Canarese:* Hesarane—; *Gujerati:* Gandhana, Nari—; *Hindi:* Bakuchi, Gandhali, Gundali, Khip, Prasaran, Prasarani, Somaraji, Somraj—; *Indo China:* Chua vot, Day mo long, Day mo trong, Ke me dang, Khua mak ton sua, Mo mat, Nguu bi dong, Nu thanh, Rau mo, Thoi dit—; *Java:* Daunkentut—; *Lepcha:* Takpoedrik—; *Malay:* Akar sekuntut, Dandangking—;

Malayalam: Talanili—; *Marathi:* Chandvela, Hiranvel, Prasarani—; *Mundari:* Bumbuinari—; *Nepal:* Padebiri—; *Pahariya:* Paedebiri—; *Pampangan:* Cantotai, Dicuta, Matabangdicut—; *Sadani:* Gitudora—; *Sanskrit:* Bala, Balya, Bhadrabala, Bhadraparni, Chandraparni, Chandravalli, Charuparni, Gandhabhadra, Gandhali, Gandholi, Gandhya, Katambhara, Prabala, Prabhadra, Prasara, Prasarani, Prasarini, Pratanika, Pratanini, Rajabala, Rajaparni, Sara, Sarana, Sarani, Saruparni, Sharana, Sharani, Somraji, Suprarasa, Suprasara—; *Tagalog:* Cantotai, Cantotan, Cantotay, Cantutac, Cantutan—; *Telugu:* Savirela—; *Urdu:* Gandhana—; *Uriya:* Gandali—.

2. **Paederia tomentosa** Blume Bijdr. 968.

Very slender climber. Leaves membranous, ovate to lanceolate, tip acute, base round or cuneate, 5.7-10 cm. long, 2.1-3.8 cm. wide; petioles 6-25 mm. long. Stipules free, triangular. Panicles like those of *foetida,* but shorter and quite scorpioid. Flowers 1.3 cm. long. Corolla 1.3 cm. long, lobes short acute. Fruit globose brown brittle, not winged.

Distribution: E. Himalaya, Khasia Mts., Burma, Malay Peninsula.—Malay Islands, China, Japan.

In Indo China, the plant is credited with antiphlogistic properties and is said to be specially useful in tenesmus.

Indo China: Chua vot, Ke me dang, Mak ton sua, Mo mat, Mo tron, Nguu bi dong, Rau mo long.

HAMILTONIA Roxb.

Trichotomously branched undershrubs; branches terete. Leaves opposite, petiolate, fetid when bruised, many-nerved; stipules intrapetiolar, short, acute, persistent. Flowers small, in broad terminal trichotomously branched panicled or subumbellate cymes, white or blue, fragrant, bracteate and bracteolate. Calyx-tube ovoid; teeth 4-5, persistent. Corolla infundibuliform; tube long, straight; lobes 5, short, valvate. Stamens 5, inserted in the throat of the corolla; filaments short, subulate; anthers included, obovate-oblong, obtuse. Ovary 5-furrowed, 5-celled, the septa soon disappearing; ovules solitary in each cell, erect from the base, anatropous; style filiform,

with 5 linear arms. Capsules 1-celled, from the absorption of the septa, 5-valved, 5- or fewer- seeded. Seeds surrounded by a loose clathrate envelope which splits into 3-4 segments from the base; cotyledons foliaceous, induplicate, cordate; radicle terete, inferior.—Species 4.—Indo-Malaya, China.

This genus is therapeutically inert.

1. **Hamiltonia suaveolens** Roxb. Hort. Beng. (1814) 15.

A small shrub with divaricate more or less herbaceous branches. Leaves rather rigid, 12.5-20 by 3.8-9 cm., elliptic-lanceolate, acute, glabrous or pubescent above, more or less hairy especially on the nerves beneath, reticulately veined, base acute; main nerves 10-16 pairs, arcuate; petioles 1.3-2 cm. long; stipules triangular, hairy. Flowers numerous, sessile or nearly so, in subglobose heads in terminal trichotomous pubescent panicles, white or blue; bracteoles beneath the calyx minute, subulate. Calyx 3-4 mm. long, hairy; tube narrow; teeth 4-5, linear-lanceolate, acute, 2 mm. long, pubescent. Corolla up to 1.3 cm. long, pubescent outside; tube slender, slightly enlarged at the top, without hairs in the throat; lobes 4-5, ovate, acute, glabrous inside, 3 by 2 mm. Capsules ellipsoid, 3-6 mm. long. Seeds 3-quetrous, with a loose arillate lace-like covering.

Distribution: Tropical and subtropical Himalayas, Central India, W. Peninsula.—China.

An infusion of the roots is given in courbature.

Bombay: Gidasawa, Didesa—; *Central Provinces:* Mahabal—; *Jaunsar:* Paderai—; *Khond:* Janamirgiri, Pitondi—; *Kolami:* Kudia—; *Kumaon:* Padera—; *Malkot:* Padera—; *Nepal:* Bainchampa—; *Punjab:* Fisauni, Gohinla, Kanera, Kantalu, Muskei, Niggi, Phillu, Phul, Pudari, Tulenni—; *Saora:* Kondamuritidi—.

Borreria G. F. W. Mey.

Annual or perennial herbs, the branches usually 4-gonous. Leaves opposite, sessile or petioled; stipules connate with the petioles in a broad truncate tube with marginal bristles. Flowers very small, in axillary or terminal fascicles; bracteoles many, of soft filiform bristles. Calyx-tube obovoid or turbinate; lobes 2-4, often with

intermediate teeth or bristles. Corolla funnel-shaped or hypocrateriform; lobes 4, valvate. Stamens 4, on the throat or tube of the corolla; anthers linear or oblong. Ovary 2-celled; ovules solitary in each cell on septal placentæ; style filiform with 2 short arms or stigma capitate. Fruit of 2 coriaceous or crustaceous mericarps which dehisce ventrally, the membranous septum sometimes remaining. Seed oblong, ventrally grooved; testa thin; albumen horny or fleshy; cotyledons small, foliaceous; radicle terete, inferior.—Species 95.—Tropics.

Root emetic.

B. emetica Mart., *B. ferruginea* DC., *B. poaya* DC., *B. verticillata* Mey. are used medicinally in Brazil.

1. **Borreria hispida** K. Schum in Engl. & Prantl Pflanzenf. IV, 4 (1891) 144.—*Spermacoce hispida* Linn. Sp. Pl. (1753) 102. —PLATE 509A (under *Spermococe hispida* Linn.).

A procumbent herb; stems quadrangular, hirsute, hispid, or subglabrous, usually with long internodes. Leaves subsessile, 1.3-5 by 0.8-2 cm., oblong or elliptic, acute, scabrid, pubescent or nearly glabrous, with scabrid or ciliate margins; stipules membranous, hispid, with few bristles which are usually longer than the sheath. Flowers 4-6, in a whorl within the stipular cup; pedicels short; bracts lanceolate-subulate, hyaline. Calyx hispid, 4 mm. long; tube narrowly campanulate, teeth as long as the tube, linear-lanceolate, very acutely pointed, reflexed, hairy. Corolla pale blue or white, 4-5 mm. long; lobes 2 mm. long, oblong, acute, bristly on the back near the tip. Stigmas 2, very short. Capsules 5 mm. long, hairy ellipsoid, rounded at both ends, crowned with the calyx-teeth, one mericarp only ventrally dehiscent, the other closed by the septum which remains attached to it, finally separating as a membranous plate. Seeds 3-4 mm. long, ½-ellipsoid, one end rounded, the other truncate, finely granulate, rounded on the back, with a deep groove on the flat face, brown.

Distribution: Himalaya from the neighbourhood of Simla eastwards and south to Ceylon, Malay Peninsula.—Malay Archipelago and Philippines, China.

The root in decoction is used as an alterative.

The seeds are substituted for coffee.

Among the Mundas of Chota Nagpur the vapour is inhaled to kill tooth worms.

Bombay: Dhoti, Ghantachibaji—; *Hindi:* Madanaghanti—; *Mundari:* Hadadumbu, Hadapota—; *Sanskrit:* Madanaghanti—; *Santal:* Pituaarak, Pituara—; *Tamil:* Nattaichuri—; *Telugu:* Madana, Madanabudata, Madanagrandhi, Modina—.

Gaillonia A. Rich.

Low rigid branched shrubs. Leaves small, rigid, opposite, linear or subulate; stipules usually connate with the petioles into a 2-setose or 2-sepinous sheath, rarely remote from the petiole or obsolete. Flowers small, solitary, or in simple spicate cymes, white. Calyx-tube ovoid; limb 2-7-toothed or -lobed, dilated after flowering into a scarious crenate wing or feathery bristles. Corolla infundibuliform; throat naked; lobes 4-5, valvate. Stamens 4-5, inserted on the throat or tube of the corolla; filaments short; anthers linear-oblong. Disk inconspicuous. Ovary 2-celled; ovules solitary in each cell, attached to the middle of the septum amphitropous; style filiform, with 2 short linear branches. Fruit small, ovoid, of 2 terete indehiscent cocci, crowned with the enlarged calyx. Seeds oblong, ventrally grooved; albumen horny; cotyledons flat; radicle slender, inferior.—Species 12.—Nubia to India.

The genus is therapeutically inert.

1. **Gaillonia aucheri** Jaub. & Spach. in Ann. Sc. Nat. ser. II, XX (1843) 87.

An undershrub, divaricately branched; branches rigid, spinescent, whitish. Leaves very small, opposite, spathulate-linear, slightly fleshy; stipules tooth-shaped; Floral leaves dissimilar, larger, as long as the stipules, feathery, forming a 6-leaved involucre. Flowers dense, forming a 3-7-flowered cyme, rarely solitary by abortion; calyx-segments setaceous, feathery, as long as the fruit; corolla puberulous, 1.2-1.5 m. down to the middle, twice as long as the calyx-limb.

At Kharan in Baluchistan, the plant is considered as a cure by smoking its leaves for sore throat and scurvy (Hughes-Buller).

The plant is soaked in water, and the liquid used to wash babies with pains in their stomach (Hotson).

Brahui: Khartusa—; *Kharan:* Tusso—.

RUBIA (Tourn.) Linn.

Scabrid hispid or prickly erect diffuse or climbing herbs; stems long, 4-gonous. Leaves 4-8 in a whorl, exstipulate. Flowers small or minute, in axillary and terminal cymes; pedicels articulate with the calyx. Calyx-tube ovoid or globose; limb 0. Corolla rotate or subcampanulate; lobes 4-5-valvate. Stamens 4-5, inserted on the corolla-tube; filaments short; anthers didymous, exserted. Ovary 2-celled; ovules solitary in each cell, attached to the septum, amphitropous; style 2-fid or styles 2; stigmas capitellate. Fruit small, fleshy, didymous or globose by the suppression of a carpel. Seeds suberect, adhering to the pericarp; testa membranous; cotyledons broad, thin; radicle slender, inferior.—Species 15.—Europe, Asia, America.

1. Leaves 4 in a whorl, petioled .... 1. *R. Cordfolia.*
2. Leaves subsessile 4-6 in a whorl .... 2. *R. tinctorum.*

The plant is tonic, diuretic, and emmenagogue.

The following are used medicinally in China and Indo China *R. cordifolia* Linn.—; in Europe and the Levant—*R. peregrina* Linn., *R. tinctorum* Linn.—; in South Africa—*R. cordifolia* Linn., *R. petiolaris* DC.—.

OFFICIAL:—The root of *R. tinctorum* var. *sativa* Linn.=*R. tinctorum* Brot. (Portugal).

1. **Rubia cordifolia** Linn. Syst. Nat. ed. 12, III (1768) 229. —*R. munjista* Roxb.; Wight Ic. t. 187.—PLATE 510.

Perennial, herbaceous, climbing; roots very long, cylindric, flexuose, with a thin red bark; stems often many yards long, rough, grooved, becoming slightly woody at the base; bark white; branches scandent by means of numerous divaricate or deflexed branchlets and petioles, quadrangular, sometimes prickly on the angles, glabrous, shining. Leaves 3.8-9 by 1.6-3.5 cm., in whorls of 4 (one pair of each whorl often larger and with longer petioles than the other),

ovate, acute, the lower leaves larger than the upper, all scabrous above, on the nerves beneath, and on the margins with minute white prickles, base rounded or slightly cordate, the base of the upper leaves sometimes acute, all 5- (rarely 7-) nerved from the base; petioles triangular, with many sharp recurved prickles on the edges, often deflexed; stipules 0. Flowers in terminal panicled glabrous cymes; branches trichotomous, spreading; bracts ovate acute, leafy. Calyx 0.85 mm. long; tube globose, glabrous, limb 0. Corolla greenish, divided nearly to the base; tube scarcely any; lobes 5, ovate, acute, 3 mm. long. Styles 2; stigmas globose. Fruit 4-6 mm. diam., didymous or globose, smooth, shining, purplish black when ripe.

Distribution: Throughout India in hilly districts, Ceylon, Malay Peninsula,—Java, Japan, Tropical Africa.

The root is sweet, bitter, acrid; heating, alexiteric, antidysenteric, antipyretic, analgesic, anthelmintic; improves the voice and the complexion; cures "kapha", inflammations, diseases of the uterus, the vagina, the eye, the ear, the blood; cures leucoderma, erysipelas, ulcers, urinary discharges, jaundice, piles.—The leaves are sweet and oleagenous; increase the appetite; cure "vata" and biliousness. —The fruit cures diseases of the spleen (Ayurveda).

There are two varieties: a wild variety and a garden variety. —The root has a bitter bad taste; laxative, analgesic, lactogogue, emmenagogue, diuretic; used in eye sores, paralysis, lethargy, liver complaints, enlargement of the spleen, pains in the joints, rheumatism, leucorrhœa, leucoderma, dysentery, uterine pains (Yunani).

In China and Malaya, the root has a certain reputation for its tonic, alterative, and astringent properties.

In the Cape Province, natives take a decoction of the leaf or root for pleurisy and other inflammatory conditions of the chest. It is said to relieve pain.

The Sutos use a decoction of the root to relieve colic, sore throats, and chest complaints, and to wash the teeth.

Zulu men take a similar decoction to cure lack of seminal emission, and adolescent Zulu females take a preparation of the root to hasten the inception of menstruation and in the treatment of overdue menses.

Dr. G. Playfair, in a note appended to his translation of the Talif-i-Sharifi (p. 150), states that, if taken to the extent of about 3 drachms, several times daily, it powerfully affects the nervous system, inducing temporary delirium, etc., with evident deterioration to the uterine system.

The stem is prescribed as a cure for snake-bite and scorpion-sting (Charaka, Sushruta, Vagbhata, Bhavaprakasha, Vaidyavinoda, Vrindamadhava, Yogaratnakara, Rasaratnakara); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Fovvah—; *Assam:* Majathi, Majetti—; *Bengal:* Majith, Manjistha, Manjit—; *Bhutia:* Soth—; *Bombay:* Madar, Manjit—; *Canarese:* Manjushtha, Manjustha—; *Canton:* Sai Kan—; *China:* Chien Ken, Ti Hsueh, Ts'ien Ts'ao—; *Deccan:* Manjit—; *English:* Indian Madder—; *Hindi:* Majit, Manjit—; *Hindubagh:* Lewrand—; *Indo China:* Gieng thao, Kim tuyen thao, Thien can—; *Kashmir:* Dandu, Fahargas—; *Khasia Hills:* Ryhoi—; *Kumaon:* Majethi, Manjit—; *Lepcha:* Vhyem—; *Malaya:* Sai Kin—; *Malayalam:* Manjetti—; *Manipur:* Moyun—; *Marathi:* Manjeshta, *Masai:* Ol ngeriandus—; *Naga:* Chenhu, Enhu—; *Nandi:* Jepsalet—; *Nepal:* Manjito—; *Persian:* Runas—; *Punjab:* Khuri, Kukarphali, Majit, Manjit, Mitu, Munzat, Runa, Runang, Sheni, Tiuru—; *Sanskrit:* Aruna, Bhandi, Bhandiralatika, Bhandiri, Bhanditaki, Chhatra, Chhatrini, Chitra, Chitralata, Chitrangi, Gandiri, Gauri, Harini, Hemapushpi, Janani, Jingi, Jvarahantri, Kala, Kalabhandika, Kalameshika, Kandira, Kandiri, Kshetrini, Latayashti, Lohitalata, Mandukaparni, Manduki, Manjishtha, Manjusha, Nagakumarika, Ragadhya, Ragangi, Rakta, Raktangi, Raktayashti, Raktayashtika, Rasayani, Rohini, Samanga, Tamramuli, Tamravalli, Tamrika, Vapra, Vasrabhushana, Vasraranjani, Vijaya, Vikasa, Yojanaparnika, Yojanavallika—; *Sinhalese:* Mandamandiniwel, Manjista, Velmadata, Yoganawel—; *Suto:* imPindisa, Mohlatswameno, Seharane—; *Tamil:* Manjitti, Shevelli—; *Telugu:* Chiranji, Manjishtatige, Tamravalli—; *Tibet:* Btsod—; *Urdu:* Majitha—; *Uriya:* Manjistha—; *Zulu:* imPindiza, imTambiso—.

2. **Rubia tinctorum** Linn. Sp. Pl. (1753) 109.

Scandent herb. Stem elongate; angles scabrid or prickly. Leaves 5-10 by 1.3-3.2 cm., subsessile, 4-6 in a whorl elliptic or lanceolate acuminate penninerved; nerves very obscure, prickly beneath. Cymes terminal, panicled, spreading, leafy. Corolla rotate; lobes ovate-lanceolate, apiculate. Anthers linear-oblong. Fruit 3-4 mm. diam., didymous and globose.

Distribution: Kashmir, Sind, Baluchistan, planted.—Afghanistan, westwards to Spain, cultivated or wild.

In Europe, the bitter plant is considered diuretic and astringent. The root has at various times been reputed effectual for promoting menstrual and urinary discharges.

Madder has been used as a remedy in liver diseases, jaundice, gall and spleen complaints. Root, leaves, and seeds are all reputed as medicinally active.

Afghanistan: Rodan, Rodang—; *Catalan:* Gransa—; *Dutch:* Krap, Meekrap—; *English:* Madder—; *French:* Garance, Garance des teinturiers, Garence—; *German:* Allizari, Farberwete, Grapp, Krapp—; *Greek:* Erevthrodanon, Erythrodanon, Tefthrion—; *Italian:* Robbia, Rubia—; *Persian:* Rodan, Rodang—; *Punjab:* Bacho—; *Roumanian:* Patachina, Rodea, Roiba—; *Russian:* Krap, Marena, Mariona—; *Sind:* Manyunth—; *Spanish:* Granza, Rubia—.

VALERIANACEAE.

Perennial or annual herbs, often with strong smelling rhizomes. Leaves opposite or radical, often much divided; stipules absent. Flowers hermaphrodite or male or female, mostly cymose, often somewhat zygomorphic. Calyx epigynous, various, sometimes the lobes plumose. Corolla gamopetalous, tubular; tube often saccate or spurred at the base; lobes imbricate. Stamens on the corolla-tube, alternate with the corolla-lobes, usually 4; anthers 2-celled, opening

lengthwise. Ovary inferior, 3-celled, only 1 cell fertile; style simple, slender; ovule solitary, pendulous from the top; fruit dry and indehiscent, 1-seeded; embryo straight; endosperm absent.—Genera 8. Species 350.—Europe, Asia, Africa, America.

1. Stamens 4. Corolla red. Calyx in fruit equally 5-lobed .... NARDOSTACHYS.
2. Stamens 3. Calyx pappose in fruit .... VALERIANA.

Root bitter, tonic, stimulant, diaphoretic, antiperiodic, antispasmodic, and anthelmintic.

Among the products isolated may be mentioned—(1) hydrocarbons—camphene, dipentene—; (2) alcohols—borneol, terpineol—; (3) aldehydes—valeric—; (4) acids—acetic, butyric, formic, malic, valerianic—.

OFFICIAL:—*Valeriana excelsa* Poiret (Sweden); *V. officinalis* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Norway, Russia, Spain, Sweden Switzerland, Turkey, United States),—var. *angustifolia* Miquel (Germany),—var. *latifolia* Miq. (Japan); *V. officinalis* Linn.=*V. altissima* Mikan (Portugal); *V. Wallichii* DC. (Great Britain).

NARDOSTACHYS DC.

Erect, perennial herbs. Leaves entire, radical elongate spathulate; cauline few. Flowers capitate, heads in cymes; bracts oblong, free or nearly so. Calyx-limb 5-lobed; in fruit enlarged, membranous, veined. Corolla tubular-campanulate, base subequal; lobes 5, spreading rosy. Stamens 4. Ovary 3-celled, 1-ovuled; style linear, stigma capitate. Fruit obovate, compressed, 3-celled, 1-seeded, the 2 barren cells smaller than the fertile. Seed obovate, compressed.—Species 2.—Himalaya.

N. jatamansi DC. is used medicinally in China and Indo China.

1. **Nardostachys jatamansi** DC. Mem. Valer. 7, t. 1.—PLATE 509B.

Rootstock woody, long, stout, covered with fibres from the petioles of withered leaves. Stem 10-60 cm., more or less pubescent upwards, often glabrate below, subscapose. Radical leaves 15-20 by 2.5 cm., longitudinally nerved, glabrous or slightly pubescent,

narrowed into the petiole; cauline 1 or 2 pairs, 2.5-7.5 cm. long, sessile, oblong or subovate. Flower-heads usually 1, 3 or 5; bracts 6 mm., oblong, usually pubescent. Corolla-tube 6 mm. long somewhat hairy within, as are the filaments below. Fruit 4 mm. long, covered with ascending white hairs, crowned by the ovate, acute, often dentate calyx-teeth.

Distribution: Alpine Himalaya, 11,000—15,000 ft., extending eastwards from Kumaon to Sikkim, 17,000 ft., and Bhutan.

The roots are acrid, bitter, with a flavour; fattening, tonic, cooling, antipyretic, alexipharmic; cure "tridosha", "kapha", biliousness, diseases of the blood, burning sensation, erysipelas, leprosy, skin diseases, throat troubles, ulcers; improve the complexion (Ayurveda).

The roots have a bitter sharp taste; tonic, stimulant, diuretic, emmenagogue, carminative, pectoral, stomachic, laxative; increase the lustre of the eyes; promote the growth and blackness of the hair; useful in gleet, cough, pain in the chest, intestinal inflammation, kidney and lumbar troubles; dry wounds; increase the appetite (Yunani).

The roots are aromatic and bitter in taste. They are supposed to possess tonic, stimulant, and antispasmodic properties, and are often employed in the treatment of epilepsy, hysteria, and convulsive affections. Used in palpitation of the heart.

The drug is a perfect representative for Valerian (O' Shaughnessy).

In Indo China, the rhizome is considered useful in epilepsy and hysteria.

This plant is said to possess all the properties of the officinal Valerian. It is said to be antispasmodic and useful in intestinal colic. It enters into the composition of a compound powder which is burnt and used for inhalation in bronchial affections. A tincture of it was used in the out-patient department in intestinal colic and flatulence, and found to give relief in those complaints (Koman).

The rhizome, in combination with other drugs, is prescribed in snake-bite (Charaka, Sushruta, Vagbhata, Brihannighantaratnakara, Sharangdharasamhita) and scorpion-sting (Charaka, Sushruta).

In snake-bite the rhizome is ground with water and applied to the eyes in stupor and coma. It is given internally in powder form or as a decoction (Roberts).

The plant is useless in the treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Arabic: Sumbululaasaffir, Sumbululhind, Sunbuluttibehindi—; *Behar:* Bekkurphus—; *Bengal:* Jatamansi—; *Bhutan:* Jatamansi, Pampe, Paumpe—; *Bombay:* Balacharea, Sumbul—; *Canarese:* Jetamavashi—; *Catalan:* Espiga nard—; *Chinese:* Kan Sung Hsiang—; *Deccan:* Billilotan, Jhatamansi—; *English:* Spikenard—; *French:* Epi de nard, Nard du Gange, Nard indien, Nard indique, Nard syriaque, Valériane de l'Inde—; *Garhwal:* Masi—; *Gujerati:* Jatamasi, Kalichhad—; *Hindi:* Balchhar, Balchir, Baluchar, Jatalasi, Jatamansi, Kanuchara—; *Indo China:* Balchkar, Jatamensis—; *Kashmir:* Bhutijatt, Kukilipot—; *Malayalam:* Jetamanshi—; *Nepal:* Haswa, Jatamangsi, Naswa—; *Persian:* Sunbuluttib—; *Sanskrit:* Akashamansi, Amritajata, Bhutajata, Bhutakeshi, Chakravartini, Gandhamansi, Gauri, Hinsra, Jadamansi, Janani, Jatala, Jatamansi, Jatavali, Jati, Jatila, Keshi, Khasambhava, Kiratini, Kravyadi, Krishnajata, Laghumansi, Limasha, Mansi, Mansini, Mata, Mishika, Misi, Mrigabhaksha, Nalada, Niralamba, Parvatavasini, Peshi, Peshini, Pishachi, Pishita, Putena, Sevali, Shvetakeshi, Sukshmajatamansi, Sukshmapatri, Tamasi, Tapasvini, Vahnini—; *Sinhalese:* Jaramansi—; *Spanish:* Espica-nardo, Nardo indico—; *Tamil:* Jatamashi—; *Telugu:* Jatamamshi—; *Urdu:* Balachhada—.

VALERIANA Tourn. ex. Linn.

Perennial, erect herbs. Leaves opposite, undivided or pinnate, mostly radical or crowded near the base of the stem; stipules none. Flowers numerous, 2- or 1- sexual, the male and female sometimes on different plants 2.5 mm. diam. or less, the smaller being 1-sexual, in bracteate cymes forming a terminal corymb or panicle. Calyx-tube adnate to the ovary; limb at flowering time scarcely perceptible, unrolling afterwards in about 12 linear, hairy lobes. Corolla funnel-shaped; limb 5-lobed, spreading. Stamens 3, inserted on the corolla-

tube, protruding. Ovary inferior, cells 3, one containing a solitary pendulous ovule, the others empty; style slender, undivided, stigma terminal. Fruit small, 1-celled, 1-seeded, crowned with the pappus-like calyx-limb.—Species 200.—Europe, Asia, Africa, America.

A. Stems not more than 50 cm. high
   1. Basal leaves subentire .... 4. *V. leschenaultii.*
   2. Basal leaves not entire .... 2. *V. wallichii.*
B. Stems 0.3—1.5 m. high
   1. Leaflets 6-10 pairs .... 1. *V. officinalis.*
   2. Leaflets 3-7 pairs .... 3. *V. hardwickii.*

The root is tonic, diaphoretic, antiperiodic, antispasmodic, antiepileptic, and anthelmintic.

The following species are used medicinally in Europe—*V. celtica* Linn., *V. dioica* Linn., *V. montana* Linn., *V. officinalis* Linn., *V. phu* Linn., *V. saliunca* All.—; in Indo China—*V. celtica* Linn., *V. hardwickii* Wall., *V. officinalis* Linn.—; in Mexico—*V. ceratophylla* H.B.K.—; in South Africa—*V. capensis* Thunb.—.

OFFICIAL:—The roots and rhizome of *V. excelsa* Poiret (Sweden); *V. officinalis* Linn. (Austria, Belgium, Denmark, France, Germay, Great Britain, Holland, Hungary, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States);—var. *latifolia* Miq. (Japan); *V. officinalis* Linn.=*V. altissima* Mikan (Portugal); *V. Wallichii* DC. (Great Britain).

The oil from the roots of *V. officinalis* Linne var. *angustifolia* Miquel (Germany).

1. **Valeriana officinalis** Linn. Sp. Pl. (1753) 31.—PLATE 511B.

Rootstock short, almost erect, thicker than the stem, producing suckers. Stem 0.3-0.9 m., erect, solitary, furrowed, smooth, hairy below, fœtid. Basal leaves long-stalked. Leaves alternate, with lobes each side of a common stalk, the leaflets in 6-10 pairs, narrowly oblong or linear, often entire, much or sparingly toothed. Flowers white or flesh-coloured. Upper bracts 2.5 mm. long, oblong-linear, shorter than the fruit. Petals united to one another so as to form a tube ending above in 5 lobes. Fruit hairless.

Distribution: Kashmir.—N. and W. Asia, Europe.

The root is officinal, being stimulant and antispasmodic. It is useful as an antispasmodic in hysteria, epilepsy, chorea and allied affections. As a stimulant, it is used in the advanced stages of fevers, low asthenic inflammations, etc.

As an antispasmodic, it is much inferior to assafœtida. In excessive doses, it causes headache, mental excitement, indicating a deranged state of the nervous system. In intermittents, it has been useful when combined with cinchona bark or other tonics. Baths of Valerian have been found very useful in acute rheumatism. The volatile oil of Valerian is also a good form of administration.

Ajmere: Billilotan, Jalalakan—; *Danish:* Baldrian, Velandsurt—; *Dutch:* Valeriaan, Wilde Valeriaan—; *English:* Capon's Tail, Cat's Valerian, Common Valerian, Healall, Great Valerian, Great Wild Valerian, Setwall, Valerian—; *French:* Herbe au chat, Herbe aux chats, Herbe de saint Georges, Herbe ă la meurtrie, Valériane, Valériane sauvage—; *German:* Augenwirz, Bullergans, Bullerjahn, Denmark, Hexenkraut, Katzenbaldrian, Katzenkraut, Katsenteriak, Katzenwargel, Katzenwurzel, Krampfwurzel, Marienwurzel, Meutenwurzel, Polterhannes, Rottenwurzel, Speerkraut, Viehkrautwurzel, Wasserbaldrian, Wiesenbaldrian, Wundwurz—; *Greek:* Phu—; *Hungarian:* Groekoenke—; *Indo China:* Cau thai, Xugen tam bai thao—; *Italian:* Agnellino, Amantilla, Borone, Erba gutta, Gataria, Phu di Dioscoride, Valeriana, Valeriana minore, Valeriana silvestre—; *Japan:* Fai so—; *Marathi:* Kalavala—; *Norwegian:* Valeriana—; *Polish:* Kozlki—; *Portuguese:* Valeriana, Valeriana das boticas—; *Roumanian:* Gusa porumbului, Navalnic, Odolean—; *Russian:* Maun, Valerian—; *Spanish:* Valeriana—; *Swedish:* Valeriana, Vende—; *Turkish:* Kediotu—; *Tuscany:* Nardo selvatico—.

2. **Valeriana wallichii** DC. Mem. Valer. 15, t. 4.—Plate 511A.

A slightly hairy perennial herb. Rootstock thick, horizontal. Stem 15-45 cm. high, usually tufted. Basal leaves often 2.5-7.5 cm. diam., long-stalked, deeply cordate-ovate, usually toothed or sinuate, sharp-pointed. Stem leaves few, much smaller, entire or pinnate. Flowers white or tinged with pink, in a terminal corymb 2.5-7.5 cm.

wide, often unisexual, the male and female on different plants. Bracteoles oblong-linear, as long as the fruit. Fruit hairy or nearly hairless.

Distribution: Temperate Himalaya, from Kashmir to Bhutan, 10,000 ft., Khasia Hills, 4,000—6,000 ft.—Afghanistan.

The root is bitter with a flavour; heating, alexiteric; cures epileptic fits, head troubles, diseases of the eye and the blood, "tridosha"; used in suppression of urine, poisoning, swooning (Ayurveda).

The root is bitter with a bad smell; laxative, astringent carminative, antiperiodic, emmenagogue, hypnotic, aphrodisiac; used for affections of the eyes and hair, pains in the joints, diseases of the liver, the spleen and the kidney; good for gleet; clears the voice (Yunani).

It is a good substitute for *V. officinalis.*

The root enters into the composition of one of Charaka's snake and scorpion remedies. Ground in cold water the root is given internally in snake-bite (Vrindamadhava, Rasaratnakara, Bapat).

The root is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

The root contains free Valerianic acid.

Afghanistan: Gurbalchorak, Mahkak—; *Arabic:* Asharuna, Mo, Sumbulejibali—; *English:* Indian Valerian—; *Persian:* Rishaiwala—; *Punjab:* Bala, Balamushk, Char, Chargodar, Dala, Mushkwali, Wala—; *Sanskrit:* Barhana, Chakra, Danda, Dandahasta, Dipana, Hasti, Jimha, Kalanusaraka, Kalanusariva, Kalanusarya, Kshatra, Kunchina, Kutil, Laghusha, Mahoraga, Nahushakhya, Nata, Padika, Parthiva, Pindatagara, Rajaharshana, Shatha, Tagara, Vakra, Vinamra—; *Urdu:* Rishawala—.

3. **Valeriana hardwickii** Wall. in Roxb. Fl. Ind. ed. Carey & Wall. I., 166; Collett Fl. Simla (1902) fig. 73.—Plate 512.

Pubescent; rootstock descending. Radical leaves few, soon disappearing, stalked, ovate, 5-10 by 3.8-7.5 cm. Stem-leaves pinnate, 7.5-15 cm., lower ones stalked, crowded, upper sessile; leaflets 3-7, lanceolate, usually entire, long-pointed, end one

largest. Flowers white, in numerous, axillary, stalked, compound corymbs forming a long, terminal panicle, often 1-sexual.

Distribution: Temperate Himalaya, from Kashmir to Bhutan, 4,000—12,000 ft., Khasia Mts., 4,000—6,000 ft.—Java.

The properties are the same as those of *V. wallichii.*

A good substiitute for *V. officinalis,* commonly used in Nepal and Northern India.

Bengal: Balchur, Tagger, Ushur—; *Bombay:* Taggerganthoda—; *Central Provinces:* Char—; *Hindi:* Asarun, Shumeo, Tagger—; *Indo China:* Cau tich—; *Kumaon:* Asarun, Shumeo—; *Punjab:* Bala, Char, Nahani, Tagger—.

4. **Valeriana leschenaultii** DC. Mem. Valer. 17; Var. *brunoniana* C. B. Clarke in Hook. f. Fl. Brit. Ind. III, 214; Wight Ic. 1043.—Plate 513.

Stem glabrous or nearly so. Leaves simple or with perhaps one or two degenerate leaflets or lobes at the base of the blade or on the 5-15 cm. leaf-stalk: Blade lanceolate, to ovate or cordate, or in the upper parts oblanceolate, entire or nearly so. Fruit glabrous.

Distribution: Nilgiris, Mysore, Coorg.

It affords a root which develops a strong odour of valeric acid when dry, and yields to distillation with water a considerable amount of volatile oil.

COMPOSITÆ.

Herbs or shrubs, rarely trees. Leaves usually alternate; stipules 0. Inflorescence a centripetal head of usually many small flowers (less commonly few or very rarely 1) sessile on the dilated top of the peduncle (receptacle), enclosed in an involucre of whorled bracts. Receptacle sometimes furnished with bracteoles (paleæ, scales,

bristles, fimbrillæ), sometimes naked and smooth or with small pits (foveolate) or deeply pitted (alveolate). Flowers either all 2-sexual or some or all 1-sexual, variously arranged. Calyx-tube wholly adherent to the ovary; limb 0 or of scales, bristles or hairs (pappus). Corolla epigynous, gamopetalous, sometimes regular, tubular, 5-4- fid or -toothed with valvate aestivation; sometimes irregular, and either ligulate or bilabiate (corolla wanting in the female flowers of Xanthium). Disk epigynous. Stamens 5-4, inserted on the corolla and alternate with its segments; filaments usually free above; anthers 2-celled, introrse, cohering into a tube which sheaths the style (very rarely free), the cells often tailed at the base. Ovary 1-celled; ovule solitary, erect, anatropous; style slender, usually 2-fid; arms (sometimes connate) linear, ½-terete, acute, obtuse, truncate or penicillate, or tipped by pubescent cones, sometimes clavate, variously papillose, stigmatic near the margins. Fruit and achene, articulated to the common receptacle, generally sessile, provided with a basilar or lateral areole indicating its points of insertion, often prolonged into a beak at the top, naked above or crowned by the persistent sessile or stipitate pappus. Seed erect; testa membranous; albumen 0; embryo straight; cotyledons plano-convex; radicle short.—Genera about 900. Species over 13,000.—Cosmopolitan.

A. Heads with the flowers all similar and tubular. Anthers cleft at the base. Leaves usually alternate. Flowers never yellow
- I. Heads distinct, many-flowered
  - a. Achenes 8-10-ribbed; pappus short, fugacious .... CENTRATHERUM.
  - b. Achenes terete, shining; pappus scanty .... LAMPRACHAENIUM.
  - c. Achenes 10-ribbed; pappus long, copious .... VERNONIA.
- II. Heads 1-, or few-flowered, crowded into dense masses like single heads
  - Corolla usually cleft laterally. Pappus chaffy .... ELEPHANTOPUS.

B. Heads with the flowers all similar and tubular. Anthers subentire at the base. Leaves opposite or alternate. Corolla rarely orange, never yellow
- Anther-tip appendiculate. Achenes 5-angled
  - a. Pappus paleaceous .... AGERATUM.
  - b. Pappus of slender hairs. Involucral bracts ∞ ...... EUPATORIUM.

C. Heads with the flowers all similar or the outer ligulate. Anthers subentire (cells not tailed) at the base. Leaves usually alternate. Receptacle almost always naked. Disk-flowers yellow; ray-flowers yellow, white or purple

I. Flowers all yellow, those of the ray ligulate
Ligules few; heads in scorpioid panicles .... SOLIDAGO.

II. Flowers all yellow, ray absent. Pappus hardly any
Receptacle conic or convex. Achenes with a terminal toothed or bristly ring .... GRANGEA.

III. Ray-flowers female, ligulate, never yellow. Disk-flowers yellow. Pappus-hairs long, copious

a. Outer involucral bracts green. Ligules long, uniseriate ... ASTER.

b. Outer involucral bracts green, narrow. Ligules 2-3-seriate .... ERIGERON.

D. Heads with the flowers all similar or the outer ligulate. Leaves usually alternate. Disk- and ray- flowers usually both yellow

I. Heads androgynous. Receptacle naked. Style-arms of hermaphrodite flowers filiform, not truncate, or style of sterile flowers entire

a. Heads corymbose or panicled, not in globose masses (except in some BLUMEA).

1. Herbs. Involucral bracts narrow. Pappus copious ... BLUMEA.

2. Shrubs or undershrubs. Involucral bracts broad. Pappus copious .... PLUCHEA.

b. Heads in dense globose or ovoid masses. Corolla of female flowers filiform
Herbs with winged stems. Pappus absent .... SPHAERANTHUS.

II. Heads androgynous or homogamous. Involucral bracts scarious, usually hyaline. Style-arms of hermaphrodite flowers truncate

a. Hermaphrodite flowers all sterile with undivided or merely notched styles
Heads corymbose. Pappus hairs quite free .... ANAPHALIS.

b. Hermaphrodite flowers all or mostly fertile with divided styles
Female flowers 2-∞-seriate. Pappus-hairs never barbellate .... GNAPHALIUM.

III. Heads heterogamous, radiate, rarely subdisciform or homogamous. Receptacle naked. Hermaphrodite flowers with linear style-arms, rounded or dilated at the top

a. Heads rayed. Pappus-hairs few or many, subequal .... INULA.

b. Heads rayed or discoid. Achenes ribbed. Outer pappus of scales inner of hairs .... PULICARIA.

E. Heads usually radiate. Receptacle paleaceous. Anther-cells not produced into tails. Achenes 3-4-angled or terete or compressed

I. Heads heterogamous or unisexual. Hermaphrodite flowers sterile, with undivided styles; female flowers apetalous
Involucral bracts of male flowers free, of female forming a 2-flowered, 2-celled capsule armed with glochidiate spines .... XANTHIUM.

II. Heads hetero- or homo- gamous. Hermaphrodite flowers all fertile. Leaves usually opposite

a. Inner involucral bracts embracing the achenes
   1. Outer involucral bracts 5-glandular .... SIEGESBECKIA.
   2. Outer involucral bracts 4, broad, in opposite pairs. A marsh herb .... ENHYDRA.

b. Inner involucral bracts not embracing the achenes
   Outer involucral bracts many .... ECLIPTA.

c. Inner involucral bracts not embracing the achenes. Paleae of receptacle concave, embracing the achenes
   1. Ray-flowers with large yellow ligules. Achenes thick .... WEDELIA.
   2. Ray-flowers with white or yellow ligules. Achenes ciliate .... SPILANTHES.

III. Heads very large. Pappus of 1-3 deciduous bristles or scales or both. Ligule yellow .... HELIANTHUS.

IV. Heads hetero- or homo- gamous. Hermaphrodite flowers all fertile or neuter. Achenes dorsally compressed

a. Outer involucral bracts herbaceous, subequal. Inner shorter like the paleae of the receptacle
   Achenes small, 4-angled. sheathed at the tip by the hairy corolla; pappus absent .... GUIZOTIA.

b. Outer involucral bracts few, small; inner membranous, connate below
   1. Style-arms with short appendages. Leaves alternate .. GLOSSOCARDIA.
   2. Style-arms with short appendages. Leaves opposite. Achenes usually 2-4-awned .... BIDENS.
   3. Style-arms with long appendages. Achenes with 2 bristles .... GLOSSOGYNE.

F. Heads usually radiate and heterogamous. Bracts of involucre herbaceous. Receptacles without paleae. Pappus absent or of scales or bristles
   Leaves opposite with oil-glands. Heads simple .... TAGETES.

G. Heads heterogamous, rayed or disciform or rayless and homogamous. Involucral bracts 2-∞-seriate. Receptacle naked or paleaceous. Style-arms truncate. Leaves usually alternate. Disk-flowers yellow, ray-flowers variously coloured

I. Receptacle paleaceous. Heads usually rayed
   a. Achenes margined. Heads corymbose .... ACHILLEA.
   b. Achenes 4-5-angled or many-ribbed. Heads peduncled ... ANTHEMIS.

II. Receptacle naked or with fimbriate pits
   a. Heads rayed, usually long-peduncled. Achenes 5-10-ribbed .... CHRYSANTHEMUM.
   b. Heads rayed. Achenes ventrally 3-5-ribbed, dorsally ∞ ribbed or plain .... MATRICARIA.
   c. Heads disciform, peduncled. Involucral bracts 1-2-seriate .... COTULA.
   d. Heads disciform, subsessile. Involucral bracts spreading in fruit .... CENTIPEDA.
   e. Heads disciform, corymbose. Involucral bracts ∞-seriate .... TANACETUM.
   f. Heads small, disciform, racemose or panicled .... ARTEMISIA.

H. Heads heterogamous, rayed or disciform. Involucral bracts usually 1-seriate and subequal. Style-arms of hermaphrodite flowers truncate or appendaged. Pappus of fine hairs. Leaves usually alternate. Disk-flowers yellow, rays usually also yellow
  I. Involucral bracts 1-2-seriate, subequal, free nearly to the base. Style-arms of hermaphrodite flowers flattened or nearly clavate, papillose
    Involucral bracts uniseriate. Heads rayed, bracteolate, solitary .... TUSSILAGO.
  II. Involucral bracts 1-2-seriate, free nearly to the base, usually with a few smaller outer ones
    a. Involucral bracts herbaceous, broad, acuminate. Heads large, rayed, long-peduncled
      Receptacle hemispheric. Herbs, leaves alternate ..... DORONICUM.
    b. Involucral bracts narrow with a few much shorter outer ones, except EMILIA and some SENECIO
      1. Heads homogamous, ebracteolate .... EMILIA.
      2. Heads homagamous, style-tips ovate. Fleshy shrubs .. NOTONIA.
      3. Heads rayed or disciform homogamous. Style-tips truncate or short or absent. Leaves radical or alternate .... SENECIO.
      4. Heads heterogamous. Hermaphrodite flowers sterile. Glabrous undershrubs .... OTHONNOPSIS.

I. Heads rayed. Involucral bracts 1-2-seriate, narrow, subequal. Style-arms of hermaphrodite flowers truncate or in sterile flowers undivided. Achenes without pappus
  Achenes incurved. Herbs, with alternate leaves .... CALENDULA.

J. Flowers all tubular. Involucral bracts many-seriate, imbricate. Tips scarious, spinous or foliaceous. Achenes often hard. Pappus various, rarely absent. Leaves alternate, often spinous
  I. Heads 1-flowered, crowded into involucrate globose balls .... ECHINOPS.
  II. Heads ∞-flowered, separate. Achenes glabrous. Pappus-hairs distinct or connate
    a. Filaments papillose-hairy. Pappus-hairs connate into a deciduous ring
      Pappus-hairs simple, not feathery .... CARDUUS.
    b. Filaments glabrous, connate
      Involucral bracts spinous. Receptacle bristly. Pappus simple .... SILYBUM.
    c. Filaments free, glabrous
      1. Pappus-hairs uniseriate, feathery, with a few outer simple .... SAUSSUREA.
      2. Pappus-hairs ∞-seriate, rigid, rough or feathery .... JURINEA.
  III. Heads separate, ∞-flowered. Achenes glabrous. Basal areole oblique or lateral
    a. Involucre not bracteate at the base or rarely so
      1. Filaments papillose. Anther-tails lacerate. Achenes smooth .... TRICHOLEPIS.
      2. Achenes terete, 10-15-ribbed .... VOLUTARELLA.

3. Achenes compressed or 4-angled, 4-5-ribbed .... CENTAUREA.
b. Involucre bracteate at the base by spinous leaves
Achenes compressed or angled. Pappus paleaceous or absent .... CARTHAMUS.

K. Heads hetero- or homo- gamous, rayed or not. Involucral bracts ∞-seriate, unarmed. Corolla 2-lipped, ligulate, or deeply 5-fid. Style-arms rounded or truncate, not appendaged. Leaves rarely opposite
Pappus-hairs feathery. Rigid shrubs .... DICOMA.

L. Heads homogamous. Corollas all ligulate. Ligule truncate, tip 5-toothed. Style-arms slender. Herbs juice usually milky. Leaves radical or alternate, never opposite
I. Achenes truncate. Pappus of scales with sometimes alternating hairs or absent
Rigid herbs. Flowers blue. Inner involucral bracts coriaceous, concave .... CICHORIUM.
II. Scapigerous herbs. Hairs various. Achenes contracted below. Pappus-hairs simple or feathery
Receptacle naked. Pappus-hairs simple .... TARAXACUM.
III. Herbs, rarely shrubby below, glabrous or hispid, rarely scapigerous. Achenes usually narrowed below. Pappus-hairs many, simple
a. Achenes compressed, beaked, ribs smooth .... LACTUCA.
b. Achenes compressed, not beaked, many-ribbed. Ribs smooth or rough .... SONCHUS.
c. Achenes narrow, truncate at both ends, 4-5-ribbed ...... LAUNAEA.

Bitterness is the prevailing characteristic of the plants which compose the Order. Therapeutically these may be divided into two groups:—(1) the *Tubulifloræ* which are generally bitter, tonic, stimulant, and astringent, and in many instances diaphoretic, diuretic, and laxative; (2) the *Liguliflorœ* which are milky, bitter, astringent, and sometimes narcotic.

The following are among the substances isolated:—(1) hydrocarbons—cadinene, dipentene, d-limonene, phellandrene, pinene—; (2) alcohols—cineol, borneol, mannitol, terpineol, thuyol—; (3) phenolic ethers—anethol—; (4) acetones—camphor, thuyone—; (5) acids—aconitic, alantic, angelic, caproic, carthamic, gallic, lactucic, nonylic, tiglic—; (6) esters—pyrethrins—; (7) sugars—glucose, laevulose—; (8) starches—inulin—; (9) resinoids—senecin, lactucopicrin—; (10) glucosides—absinthin, anthemic acid, arnicin, centaurein, cyanin, eupatorin, gaultherin, inulin, lactucenin, lactucin, moschatin—; (11) alkaloids—abrotin, achilleine, echinopseine,

β-echinopsine, echinopsine, lobelanidine, lobelanine, isolobelanine, lobelidine, lobeline, moschatine, senecifolidine, senecifoline, senecine, senecionine—; (12) miscellaneous drugs—absinthiin, absinthin, pyrethrin, santonin—.

The toxic glucoside arnicin has been isolated from *Arnica montana* Linn. and *Doronicum pardalianches* Linn.—; inulin has been found in *Anacyclus pyrethrum* DC.

OFFICIAL:—Santonin is official in all pharmacopœias.

Achillea millefolium Linn. (Austria, Portugal, Russia, Sweden, Switzerland).

Anacyclus aureus Linn.=*Anthemis aurea* De Cand. (Portugal); *A. aureus* Brot. non Linn.=*Anthemis odora* Hoffmseg. & Link. (Portugal); *A. Pyrethrum* DC. (Austria, France).

Antennaria dioica Linn. (Belgium).

Anthemis nobilis Linn. (Austria, Belgium, France, Holland, Italy, Spain, Switzerland)=*A. aurea* Brot. (Portugal); *A. Pyrethrum* Linn.=*Anacyclus Pyrethrum* De Cand. (Portugal),—DC. (Austria).

Arctium Lappa Linn.=*Lappa tomentosa* and *L. major* Gaertn. (Portugal); *A. majus* Bernh. L. (Spain); *A. minus* Schkur.=Lappa *minor* De Cand. (Portugal).

Arnica montana Linn. (Austria, Belgium, Denmark, France, Germany, Holland, Italy, Norway, Russia, Spain, Sweden, Switzerland, Turkey)=*Doronicum* Arnica Desfont. (Portugal).

Artemisia spp. (Denmark, Great Britain, Italy, Portugal, Spain); *A. Abrotanum* Linn. (Portugal); *A. Absinthium* Linn. (Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, Switzerland, Turkey)=*Absinthium officinale* Brot. (Portugal); *A. arborescens* Linn.=*Absinthium arborescens* Brot. (Portugal); *A. cina* Berg. (Austria, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Switzerland); *A. cina* Willkomm (Sweden); *A. maritima* Linn. (Italy),—var. *pauciflora* Led. (France),—var. *pauciflora* Weber (Spain),—var. *α-Stechmanniana* Besser (Belgium); *A. mollis* Gay =*A. chinensis* Burm. non Linn. (Portugal); *A. paniculata* Lam.

(Portugal); *A. pauciflora* Stechmann (Portugal),—Weber (Denmark); *A. procera* Willd. (Portugal); *A. vulgaris* Linn. (France, Switzerland=*A. officinalis* Gat. (Portugal).

Blumea balsamifera DC. (Holland).

Carbenia benedicta Adans. (Holland).

Centaurea benedicta Linn.=*Cnicus benedictus* Gaertn. (Portugal).

Cichorium Endivia Linn. var. *sativa* Willd. (Portugal) *C. Intybus* Linn. (France, Italy)=*C. sylvestre* G. Bauh. (Portugal).

Cnicus benedictus Linn. (Belgium, Germany, Sweden, Switzerland).

Cotula aurea Linn. (Spain).

Gnaphalium dioicum Linn. (France).

Grindelia camporum Greene (Great Britain); *G. robusta* Nutall (Spain),—Nutt. (France, Russia); *G. squarrosa* (Pursh.).

Helianthus annuus Linn. (Russia).

Inula Helenium Linn. (Holland)=*Corvisartia Helenium* Merat (Portugal).

Lactuca spp. (Spain); *L. altissima* Bieberstein (Portugal, Spain); *L. sativa* Linn. var. *longifolia,* var. *capitata,* var. *crispa* (Portugal); *L. virosa* Linn. (Holland, Hungary, Portugal, Spain).

Lappa vulgaris Neilreich (Austria).

Leontodon Taraxacum Linn.=*Taraxacum officinale* Villars (Portugal).

Matricaria Chamomilla Linn. (Austria, Denmark, Germany, Holland, Italy, Japan, Norway, Portugal, Spain, Sweden, Switzerland, Turkey)=*Chamomilla vulgaris* K. Koch (Russia)=*Chrysanthemum Chamomilla* Bernh.=*Chamomilla officinalis* C. Koch (Hungary); *M. suaveolens* Pursh. (Russia).

Spilanthes oleracea Jacq.=*Pyrethrum Spilanthus* Medik. (Portugal); *S. radicans* Schrader=*Cotula piper* Velloso (Portugal).

Tanacetum vulgare Linn. (Belgium, Portugal).

Taraxacum spp. (Sweden); *T. Dens-leonis* Linn. (France); *T. officinale* Wiggers (Austria, Great Britain, Hungary, Japan)=

Leontodon Taraxacum Linn. (Russia); *T. officinale* (Withering) Wiggers (Switzerland).

Tussilago farfara Linn. (Austria, Denmark, France, Germany, Norway, Russia, Sweden, Turkey)=*T. vulgaris* Lamk. (Portugal).

Xanthemum annuum Brot. non Linn.=X. inapertum Hoffmseg. & Link. (Portugal).

LAMPRACHAENIUM Benth.

An erect branched annual with crisped hairs. Leaves alternate, petiolate, toothed, clothed beneath with white tomentum. Heads small, laxly subcorymbosely paniculate, homogamous. Involucre subcampanulate; bracts many-seriate, dry, the inner acute. Receptacle flat, naked. Corollas purple, all tubular, equal, regular; tube slender; limb narrowly 5-fid. Anthers obtusely auricled. Style-arms subulate, hairy. Pappus-hairs few, short, fugacious, red. Achenes obovoid, slightly compressed, shining, not ribbed, quite glabrous.—Species 1.—India.

1. **Lamprachænium microcephalum** Benth. in Benth. and Hook. f. Gen. Pl. II (1873) 226.—PLATE 515B.

An erect herb 30-60 cm. high; stem simple or branched, glabrous, hairy or glandular, often tinged with purple. Leaves 5-7.5 by 2.5-3.8 cm., elliptic, acuminate, sparsely clothed with short bristly hairs above, densely covered with white wooly tomentum beneath, distantly bristle-serrate, tapering at the base; petioles 1-2 cm. long. Heads small, 4.5-8 mm. diam., numerous, on slender hairy peduncles. Involucral bracts elliptic-lanceolate, cuspidate, white-tomentose on the back; the exterior foliaceous at the tip, erect or recurved, acute, with densely ciliate margins; the interior a little longer, scarious, villous. Pappus reddish, equalling the corolla-tube, rigid. Achenes 2-2.5 mm. long, obovoid, turgid, slightly compressed, smooth, shining.

Distribution: Mahableshwar, S. M. Country, Mysore.

The plant smells of chamomille and is used as an aromatic bitter.

The plant is bitter with a flavour; used in skin diseases, leucoderma; cures "vata," "kapha," inflammations (Ayurveda).

Bombay: Brahmadandi—; *Sanskrit:* Ajadandi, Brahmadandi—.

VERNONIA Schreb.

Herbs or shrubs. Leaves simple, alternate, entire or toothed. Heads terminal or axillary, homogamous, cymose or panicled. Involucre ovoid, globose or hemispheric, equalling or shorter than the flowers; bracts in many series, the inner longest. Receptacle naked or pitted, sometimes shortly hairy. Corollas all equal, regular, tubular slender; lobes 5, narrow. Anther-bases obtuse. Style-arms subulate, hairy. Pappus usually 2-seriate of many hairs, often girt with a row of outer short hairs or flattened bristles. Achenes striate, ribbed or angled, rarely terete.—Species 650.—America, Africa, Asia.

1. Achenes silky. Pappus yellowish or reddish .... 3. *V. teres.*
2. Achenes sparsely hairy. Pappus dirty white or reddish ...... 2. *V. roxburghii.*
3. Achenes slightly narrowed at the base, clothed with appressed white hairs. Pappus white .... 1. *V. cinerea.*

Root tonic, febrifuge and emetic.

The following species are used medicinally in Indo China—*V. cinerea* Less., *V. teres* Wall.—; in La Reunion—*V. cinerea* Less.—; in Madagascar—*V. appendiculata* Less., *V. pectoralis* Baker, *V. scariosa* Baker—; in Nigeria—*V. amygdalina* Del., *V. kotschyana* Schultz, *V. nigritiana* Oliv. and Hiern.—; in the Gold Coast—*V. amygdalina* Del., *V. biafræ* Oliv. and Hiern.—; *V. conferta* Benth. *V. nigritiana* Oliv. and Hiern., *V. senegalensis* Less.—; in Guinea—*V. nigritiana* Oliv. and Hiern., *V. senegalensis* Less., *V. thomsoniana* Oliv. and Hiern.—; in Gambia— *V. colorata* Draque, *V. nigritiana* Oliv. and Hiern.—; in South Africa—*V. corymbosa* Less., *V. hirsuta* Sch. Bip., *V. kraussii* Sch. Bic., *V. natalensis* Sch. Bip., *V. woodii* Hoffm.—.

1. **Vernonia cinerea** Less. in Linnæa IV (1829) 291.—PLATE 516.

Annual, erect, 15-75 cm. high; stem stiff, cylindric, striate, more or less pubescent, slightly branched. Leaves petioled, 2.5-5 by 2-3.8 cm. (the upper leaves the smallest), variable in shape, broadly-elliptic or lanceolate, obtuse or acute, shortly mucronate, more or

less pubescent on both sides, irregularly toothed or shallowly crenate-serrate; petioles variable, 6-13 mm. long. Heads small, about 20-flowered, 6 mm. diam., in lax divaricate terminal corymbs, with a minute linear bract beneath each head of flowers and with small bracts in the forks of the peduncles; flowers pinkish violet. Involucral bracts linear-lanceolate, awned, silky on the back. Pappus white, the exterior row short, about 0.5 mm. long. Achenes 1.25 mm. long, oblong, terete (not ribbed), slightly narrowed at the base, clothed with appressed white hairs.

Distribution: Throughout India.—Tropical Africa, Asia and Australia.

The plant is sweet, cold; tonic, stomachic, astringent; cures "tridosha," consumption, asthma, bronchitis.—The flowers cure fevers (Ayurveda).

The plant is used in decoction to promote perspiration in febrile conditions. The expressed juice is given in piles.

The seeds are employed in Patna as an alexipharmic and anthelmintic, and as a constituent of masalas for horses. In Chota Nagpur, the whole plant is given as a remedy for spasm of the bladder and strangury; the flowers are administered for conjunctivitis; the root is given for dropsy.

In Ceylon, it is used for wounds and sores, and taken internally to promote perspiration.

This plant is considered to possess strong diaphoretic properties, and is generally given by vaidyans to produce perspiration in fever. By itself, it has no antiperiodic property, but when combined with a small dose of quinine, it appears to help the action of the latter in malarial fevers. At Cannanore, I found that one of the vaidyans there was treating cases of malarial fever with *V. cinerea* and 5 grs. of quinine made into a bolus with lime juice administered every morning. I tried this method in several cases and found it to be a useful combination (Koman).

Sushruta recommends the plant for the treatment of scorpion-sting; but it is not an antidote to scorpion-venom (Caius and Mhaskar).

Bengal: Kalajira, Kukshim, Kuksim—; *Ceylon:* Chitiviyarchenkalainir—; *English:* Ash-coloured Fleabane—; *Ewe:* Osikonu—;

French: Ayapana sauvage, Vernonia cendré—; *Gujerati:* Sadodi, Sedardi, Shedardi—; *Hindi:* Dandotpala, Sahadevi, Sadodi, Sadori—; *Indo China:* Bac dau—; *Madras:* Nirnochi—; *Malay:* Ekor Kudah, Rumput sabagi, Rumput susor daun, Sembong hutan, Tahi babi, Tambak bukit, Tambak tambak—; *Malayalam:* Puvankuruntal—; *Marathi:* Osari, Sadodi, Sahadevi—; *Merwara:* Kaliharr, Lalia—; *Nasirabad:* Bhumbak—; *Porebunder:* Sadedi, Sadevi, Sadodi—; *Punjab:* Sahadevi—; *Sanskrit:* Dandotpala, Devasasha, Devika, Gandhavalli, Govandani, Saha, Sahadeva, Sahadevi, Vishamajvaranashini, Vishvadeva—; *Santal:* Bahututuri, Barangom, Birlopongarak, Duryaarak, Jhurjhuri—; *Sinhalese:* Monarakudumbia, Monerakudimbeya—; *Tamil:* Puvamkurundal, Sahadevi, Sirashengalanir—; *Telugu:* Garitikamma, Gharitikamini—.

2. **Vernonia roxburghii** Less in Linnæa (1831) 674.

An erect rigid scabrid perennial herb or undershrub. Leaves subsessile, 10-12.5 cm. long, elliptic or obovate-lanceolate, acuminate, deeply serrate, subcoriaceous, rough on both surfaces; nerves sharply prominent beneath. Heads many, 1.3-2 cm. diam., fascicled in terminal panicled corymbs. Outer bracts of involucre subulate; inner 8 mm., linear, obtuse and apiculate, or acuminate and pungent; all more or less woolly outside. Achenes 2.5 mm. long, sparsely hairy between the ribs. Pappus dirty white or reddish.

Distribution: Upper Gangetic Plain, Kumaon, Bengal, Burma, Central and W. India.

It is said to have the same medicinal properties as *V cinerea.*

Ceylon: Kadduchchirakam—; *Mundari:* Kutunaba—; *Sinhalese:* Sanniyakam—.

3. **Vernonia teres** Wall. Cat. 2926.

A rigid scabrid herb with simple erect leafy stems 30-75 cm. high, pubescent with brown hairs. Leaves hard subsessile narrowly oblong to obovate, 5-12.5 cm. long, acute scabrid and punctulate above, hispid beneath, with few distant mucronate teeth, reticulate. Heads large, 1.5-2 cm. long and nearly as broad, sessile mostly solitary in the axils but with often 2-3 terminal. Involucre rather cobwebby, bracts lanceolate or outer subulate, often squarrose,

tapering into a short awn. Fruit about 8-10-ribbed, silky, 3.2-3.8 mm. long, with pappus 7.5 mm. long, dirty white or reddish.

Distribution: Tropical Himalaya from Kumaon to Sikkim, Bihar, Central India, Pegu, Burma.

A popular medicine in Annam for luxations, ulcers and wounds. It is given for dysmenorrhœa and dropsy. The flower heads are considered ascaricidal.

Annam: Cay man tuoi, Trach lan thao—; *Quang-tri:* Cay muoi tuoi—; *Tongking:* Man tuoi—; *Vinh:* Co xanh—.

CENTRATHERUM Cass.

Erect or diffusely branched herbs. Leaves alternate, petiolate, usually toothed. Heads homogamous, pedunculate, many-flowered, solitary, terminal or leaf-opposed, rarely corymbose. Involucre subhemispheric; bracts many-seriate, imbricate, the inner dry or scarious, the outer herbaceous, often leafy. Receptacle flat, naked or pitted. Corollas purple, all tubular, equal; tube slender; limb narrowly 5-fid. Anthers sagittate at the base; auricles obtuse. Style-arms subulate, hairy. Pappus scanty or copious, short, fugacious. Achenes obtuse, with 8-10 more or less prominent ribs.—Species 15.—Tropics.

The genus has little medicinal value.

1. **Centratherum anthelminticum** O. Ktze. Rev. Gen I, 320.—*Vernonia anthelmintica* Willd. Sp. Pl. III (1800) 1634.—PLATE 515A.

Annual, robust, erect, leafy; stems 60-90 cm. high, branched, pubescent. Leaves 5-9 by 2.5-3.2 cm., lanceolate or elliptic-lanceolate, acute, coarsely serrate, more or less pubescent on both sides, base tapering into the petiole. Heads 1.3-2 cm. diam., subcorymbose, many- (about 40-) flowered, with a linear bract near the top of the peduncle. Outer involucral bracts linear, hairy, herbaceous, shorter than those of the inner rows; intermediate bracts with herbaceous hairy tips, linear, acute or subobtuse, often constricted at the base of the herbaceous part, equalling or shorter (rarely longer) than the innermost; innermost bracts usually the longest, linear, subacute,

scarious, often tipped with purple. Pappus reddish, the exterior row very short, subpaleaceous, persistent, the inner hairs somewhat flattened, deciduous, much shorter than the glabrous corollas. Achenes 4.5-6 mm. long, oblong-cylindric, 10-ribbed, pubescent.

Distribution: Throughout India. Often cultivated. Ceylon.

The seeds have a hot sharp taste; acrid, astringent to the bowels, anthelmintic; cure ulcers, "vata" and "kapha"; used in skin diseases, leucoderma, and fevers (Ayurveda).

The seeds have a sharp bitter taste; anthelmintic, purgative; used for asthma, kidney troubles, hiccough; applied in inflammatory swellings; remove blood from the liver; good for sores and itching of the eyes; a depilatory (Yunani).

The seeds are considered as powerfully anthelmintic, and are also an ingredient of a compound powder prescribed in snake-bites. On the Malabar Coast, an infusion of the seeds is given for coughs and against flatulency. In the Punjab, it is considered a febrifuge.

The seeds are very bitter and are used instead of quinine by the Mundas of Chota Nagpur. In paralysis of the legs the powdered seeds are applied externally. When the stomach of cattle swells, *e.g.*, after they have grazed too much on paddy or rambra plants, the powdered seeds are mixed in equal quantity with salt and soot of the fireplace. This is dissolved in water with the addition of two capsules of Spanish pepper, and given as a drink.

In Travancore, the bruised seeds, ground up in a paste with limejuice, are largely employed as a means of destroying pediculi. They are also given in anasarca and used for plasters for abscesses.

The seeds are also credited with tonic, stomachic, and diuretic properties.

The juice of the leaf is given to cure phlegmatic discharges from the nostrils.

In Ceylon, the plant is used for fever convulsions.

The seeds of this plant are considered to possess very strong

anthelmintic properties by vaidyans. They are also administered in cases of intestinal colic and dysuria. They also enter into the prescription for leucoderma, psoriasis, and other skin affections. The powdered seeds followed by castor oil were tried for removal of roundworms in ½ to 1½ drachms doses and the result as far as could be ascertained showed the seeds to possess considerable anthelmintic properties. Confirmatory trials gave completely satisfactory results (Koman).

The powdered seeds, even in 4 drachms doses with the usual purges, failed to expel hoowkorms and roundworms (Caius and Mhaskar).

The seeds in combination with other drugs are prescribed for snake-bite (Charaka, Sushruta) and scorpion-sting (Charaka, Sushruta, Vagbhata, Vrindamadhava, Vaishajyaratnavali, Chakradatta, Ashtangasangraha); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Arabic: Atarilal, Itrilal, Kamunebari—; *Bengal:* Babchi, Bapchie, Bukshie, Hakuch, Kaliziri, Somraj—; *Bombay:* Kalenjiri, Kalijiri—; *Canarese:* Kadujirige, Kalajirige, Sahadevi—; *Deccan:* Kalajira, Kalijiri, Karviziri—; *English:* Purple Fleabane—; *French:* Herbe aux mouches—; *Gujerati:* Kadvojiri, Kalijiri—; *Hindi:* Bakshi, Buckshi, Kalijhiri, Kaliziri, Somraj, Vapchi—; *Kumaon:* Kalijiri—; *Malayalam:* Kalajirakam, Kattujirakam, Puvankuruntala—; *Marathi:* Kalajira, Kalenjiri, Kalijiri, Karalye, Ranachajire—; *Mundari:* Karigiri, Karijiri, Karijuri, Saoraj—; *Persian:* Atarilal, Itrilal—; *Porebunder:* Kalijiri—; *Punjab:* Bukoki, Kakshama, Kalazira, Kaliziri, Malwabakshi—; *Sanskrit:* Agnibija, Aranyajiraka, Avalguja, Atavijiraka, Brihanyali, Kana, Kananajiraka, Krishnaphala, Kshudrapatra, Putiphali, Somraji, Tiktajiraka, Vakushi, Vanajiraka—; *Sinhalese:* Sanninaegam, Sanninasang, Sanninayan—; *Tamil:* Kattuchiragam, Neychitti, Nirnochi, Sittilai—; *Telugu:* Adavijilakatta, Garitikamma, Nelavavili, Vishakantakamulu—; *Tulu:* Kalajirdari—; *Urdu:* Janglijiri—; *Uriya:* Somraj—.

Elephantopus Linn.

Rigid usually perennial herbs. Leaves alternate. Flowers in homogamous heads of 2-5-flowers, collected into a head-like cluster. Involucre oblong, compressed; bracts about 8 in 2 rows, the outer the shorter. Receptacle small, naked. Corollas equal, subregular or most commonly subpalmately spreading from the inner side, being deeply cleft; lobes 5, narrow. Anthers sagittate at the base, with obtuse auricles. Style-arms subulate, minutely hairy. Achenes truncate at the apex, 10-ribbed. Pappus-bristles 1-2-seriate, rigid, shining, slender and dilated below or chaff-like.—Species 20.—Tropics, chiefly American.

E. scaber Linn. is used medicinally in Indo China, Malaya, La Reunion and Madagascar; *E. martii* Graham in Brazil.

1. **Elephantopus scaber** Linn. Sp. Pl. (1753) 814; Wight Ic. t. 1086.—Plate 517.

Erect, 15-38 cm. high; rootstock short, giving off many stout fibrous roots; stem usually dichotomously branched, strigose, with appressed white hairs. Leaves mostly radical, 12.5-20 by 3.8-5.7 cm., forming a spreading rosette on the ground, obovate-oblong, rounded or subacute, coarsely serrate-dentate, more or less hairy on both surfaces, base tapering into an obscure petiole; main nerves numerous, prominent beneath, with reticulate veins between; cauline leaves smaller than the radical, sessile or nearly so. Heads numerous, sessile, closely packed, forming a large flat-topped terminal inflorescence nearly 2.5 cm. across and surrounded at the base by 3 large stiff broadly-ovate cordate conduplicate conspicuously nerved leafy bracts. Involucral bracts in 2 series enclosing 4 flowers; bracts of the outer row half as long as those of the inner, 1-nerved; bracts of the inner row usually 3- (rarely 5-) nerved, scarious, linear, cuspidate. Corolla violet, exserted; tube long, slender; limb deeply cleft on one side, causing the 5 linear lobes to present a palmate appearance. Style much exserted, the arms recurved. Pappus white, 1-seriate, consisting of 5 (rarely 4) rigid bristles dilated at the base.

Gobhi, Gojivha, Gojivhika, Hdhapushpi, Kharapatri, Kurasa, Satamulika, Vatona—; *Santal:* Manjurjuti—; *Sinhalese:* Ataddeya, Etadi—; *Tagalog:* Tabatabacahan—; *Tamil:* Anashovadi—; *Telugu:* Eddumalikechettu, Enugabira, Hastikasaka—; *Urdu:* Gobhi—.

AGERATUM Linn.

Erect herbs or undershrubs. Leaves opposite or the upper alternate. Heads homogamous, in dense corymbs or lax panicles; flowers blue, purple or white. Involucre campanulate; bracts 2-3-seriate, linear, subequal. Receptacle flat, or nearly so, naked or with caducous scales between the flowers. Corollas all tubular, regular, the tube scarcely distinct from the shortly 5-fid limb. Anthers appendiculate at the apex, obtuse at the base. Style-arms elongate, obtuse. Pappus of 5 short free or connate scales or of 10-20 narrow unequal scales. Achenes 5-angled.—Species 45.—Tropics, all but one American.

A. conyzoides Linn. is used medicinally in Brazil, Guiana, Madagascar, La Reunion, Togoland, Gold Coast.

1. **Ageratum conyzoides** Linn. Sp. Pl. (1753) 839.—PLATE 518C.

Annual, 30-90 cm. high; stem erect, branched, terete, more or less hairy. Leaves opposite or the upper alternate, 5-7.5 by 2.5-5 cm., broadly ovate, subacute, crenate and with ciliate margins, more or less hairy on both sides, base cuneate; petioles 2.5-3.2 cm. long, hairy. Heads small, in dense terminal corymbs; flowers pale blue or white, malodourous. Involucral bracts linear, very acute, ribbed on the back, ciliolate and with scarious margins. Pappus of 5-scales, aristate, dilated at the base, serrulate, about equalling the corolla. Achenes 2-2.5 mm. long, sharply angled, sometimes glandular, attenuated at the base, black.

Distribution: Throughout India.—All hot countries.

The leaves applied to wounds act as a styptic and heal them quickly.

The juice of the root is said to possess antilithic properties.

The plant is applied externally in ague; the juice is said to be a good remedy for prolapsus ani.

In Ceylon, the leaves are commonly used for wounds and sores. In Indo China, the root and the leaves are considered antidysenteric.

The plant is a household medicine in Madagascar and La Reunion. As a fomentation the leaves and stems are used in skin diseases, more particularly leprosy; and they are prescribed as a bath to patients with ecchymoses. A poultice of the leaves is applied on boils; it is said to prevent tetanus if applied to a wound. A cold decoction of the roots is used as a lotion in purulent ophthalmia.

In the Gold Coast, the leaves are squeezed and yield a juice which is used as a lotion for the eyes.

In Togoland, the plant is used to cure fever.

An infusion is given in Brazil and Guiana as a stimulant tonic in diarrhœa and flatulent colic.

A preliminary examination of the essential oil from the plant has been carried out by Moudgill (*Journ. Ind. Chem. Soc.;* 1924-25).

Bengal: Dochunty—; *Betsimisaraka:* Fotsivony, Tinimbo—; *Bombay:* Osari, Sahadevi—; *Brazil:* Camara apeba, Fumo bravo, Mentrasto, Suacuaira—; *Ceylon:* Pumpillu—; *Ewe:* Mimang—; *Fanti:* Efungmormoe—; *French:* Herbe à Madame—; *French Guiana:* Raguet françois—; *Gold Coast:* Goat Weed—; *Gujerati:* Ajgandha, Gandhari sedardi, Mankdamari—; *Indo China:* Bong thui, Bu xich, Cut lon, Thang hong ke—; *Karwar:* Ghayamari—; *Kathiawar:* Makadamari—; *Konkani:* Sahadevi—; *La Reunion:* Herbe ă bouc—; *Madagascar:* Hanitrinimpantsaka—; *Malay:* Sianggit, Tahi ayam, Tombok jantan—; *Malayalam:* Appa, Muryanpacha—; *Marathi:* Ghaneraosadi—; *New Caledonia:* Adivijalakara—; *Sinhalese:* Hulantala—; *Twi:* Gu airkuna—; *Wassaw:* Ahaban kankan—.

Eupatorium (Tourn.) Linn.

Herbs, shrubs or undershrubs. Leaves opposite or alternate. Heads corymbose, homogamous. Involucre long or short; bracts few- or many-seriate, subequal or outer shorter; receptacle naked.

Corollas all equal, regular, tubular; tube slender; limb 5-lobed or toothed. Anthers appendaged, base obtuse. Style-arms long, obtuse. Achenes truncate, 5- angled or -ribbed; pappus-hairs 1-seriate, many, rigid, scabrid.—Species 450.—Mostly American, a few in Europe, Asia, tropical Africa.

1. Pubescent .... 1. *E. cannabinum.*
2. Glabrous .... 2. *E. triplinerve.*

The genus is tonic and stimulant, diaphoretic, emmenagogue, emetic, cathartic, and alexipharmic.

The following species are used medicinally in Europe—*E. cannabinum* Linn.—; in China—*E. chinense* Linn., *E. japonicum* Thunb.—; in Indo China—*E. ayapana* Vent., *E. cannabinum* Linn., *E. stoechadosmum* Hance—; in Malaya—*E. japonicum* Thunb.—; in the Philippine Islands—*E. ayapana* Vent.—; in Mauritius and La Reunion—*E. ayapana* Vent.—; in Jamaica—*E. villosum* Sw.—; in the West Indies—*E. ayapana* Vent.—; in North America—*E. aromaticum* Linn., *E. perfoliatum* Linn., *E. purpureum* Linn., *E. teucrifolium* Willd.—; in Mexico—*E. collinum* DC.—; in Central America and Guiana—*E. parviflorum* Sw.—; in Brazil and South America—*E. ayapana* Vent.—; in Madagascar—*E. ayapana* Vent.—.

1. **Eupatorium cannabinum** Linn. Sp. Pl. (1753) 838. —PLATE 518B.

Pubescent; stems 1.2-1.8 m. Leaves sessile in distant pairs, sometimes whorled, lanceolate, 10 by 3.8 cm., coarsely toothed. Heads 8 mm. long, in compact, rounded corymbs. Involucral bracts very unequal, outer short, inner acute; flowers nearly white.

Distribution: Temperate Himalaya, 3,000—11,000 ft., Khasia Hills, 3,000—6,000 ft., Burma.—Europe, temperate Asia.

The roots and the leaves are both emetic and diuretic.

The herb is used as an emmenagogue and purgative in Indo China.

Bombay: Bundar—; *Catalan:* Canabassa—; *Dutch:* Boelskenkruid, Koninginnekruid—; *English:* Hemp Agrimony—; *French:* Eupatoire, Eupatoire d'Avicenne, Eupatoire ă feuilles de chanvre, Eupatoire chanvrine, Eupatoire commun, Eupatoire de Mésué, Herbe julienne, Herbe de sainte Cunégonde, Origan aquatique, Origan des marais, Pantagruelion—; *German:* Kunigundenkraut, Wasserdost, Wasserhanf—; *Indo China:* Bach son, Thach lam—; *Italian:* Canapa acquatica, Eupatorio, Eupatorio di Avicenna—; *Malta:* Hemp Weed, Water Agrimony, Canapa acquatica—; *Roumanian:* Canipioala—; *Spanish:* Eupatorio, Eupatorio de los Arabes, Eupatorio de Avicenna, Yerba del angel—; *Swedish:* Floks—.

2. **Eupatorium triplinerve** Vahl Symb. III, 97.—*E. Ayapana* DC. Prod. V, 169.—PLATE 518A.

An undershrub, ascending, branching, glabrous. Leaves subsessile, opposite, lanceolate, 3-nerved, acuminate, subentire, glabrous. Inflorescence a lax few-headed corymb, heads pedicellate about 20-flowered; bracts subuniseriate, linear, acuminate, unequal puberulous on the back. Flowers slaty blue, corollas all equal, regular, tubular, tube slender, anthers appendaged, base obtuse, style-arms long, obtuse. Achenes truncate 5-angled, pappus-hairs uniseriate, many, rigid, scabrid.

Distribution: Native of America.—Planted in Indian gardens.

Ayapana may be compared with chamomile in its effects; it is stimulant and tonic in small doses, and laxative when taken in quantity; the hot infusion is emetic and diaphoretic, and may be given with advantage in the cold stage of ague and in the state of depression which precedes acute inflammatory affections.

An infusion of the whole plant is used as a stimulant, diaphoretic, and tonic in the Philippine Islands, Mauritius, La Reunion, and Madagascar.

The decoction of the plant and the juice of the leaves are considered detergent and applied to foul ulcers in the Philippines.

An infusion of the leaves is given in Indo China and Guiana as an alexipharmic and a sudorific.

The herb is a snake remedy in Guiana, Brazil, the Philippine Islands, and India. The whole plant is given in the form of a decoction, and the juice of the leaves is given internally and appiled externally to the part bitten.

The plant is useless in the symptomatic treatment of snake-bite. The leaves are useless whether given internally or appiled externally to the part bitten (Mhaskar and Caius).

Nag and Bose have given an account of a chemical and physico-chemical examination of the plant (17th Ind. Sc. Congress; Allahabad, 1930).

Annam: Cay bach son, La da yot, Trach lam, Trach lam diep—; *Betsimisaraka:* Ayapana—; *Brazil:* Ayapana—; *Cochin China:* La ba giot—; *English:* Ayapana Tea—; *French:* Ayapana vrai—; *Gujerati:* Alleppa—; *Indo China:* Ba dot, Ca dot—; *Marathi:* Ayapana—; *Spanish:* Ayapana—; *Tagalog:* Apana, Ayapana—.

SOLIDAGO (Vaill.) Linn.

Perennial herbs. Leaves alternate. Heads small, often in scorpioid cymes, heterogamous, rayed, yellow; ray-flowers few, 1-seriate, female, ligulate; disk-flowers tubular, 5-fid. Involucre oblong or campanulate; bracts many-seriate, coriaceous; receptacle small, usually pitted. Anther bases obtuse. Style-arms of hermaphrodite flattened, tips lanceolate. Achenes subterete or angled, 8-12-ribbed; pappus-hairs 1-2-seriate, slender, scabrid.—Species 90.—American, 1 in Europe.

The flowers are tonic, astringent, diaphoretic, carminative, and vulnerary.

The following are used medicinally in Europe—*S. virgaurea* Linn.—; in Indo China and Malaya—*S. virgaurea* Linn.—; in North America—*S. odora* Ait., *S. virgaurea* Linn.—; in Brazil—*S. vulneraria* Mart.—.

1. **Solidago virga-aurea** Linn. Sp. Pl. (1753) 880.—PLATE 519B.

An erect, pubescent herb; stems 15-60 cm., rarely branched. Leaves alternate, lanceolate; lower 10-12.5 cm., stalked, toothed; upper smaller, sessile, entire. Heads radiate, 1 cm. long, numerous, crowded in a long, leafy, terminal panicle. Involucral bracts unequal, narrow, acute; receptacle naked; flowers yellow; pappus long, rough; ray-flowers not more than 10 or 12; corolla of inner flowers 5-lobed; style-arms of inner flowers flattened, acute. Achenes ribbed.

Distribution: Temperate Himalaya, from Kashmir eastwards, 5,000—9,000 ft., Khasia Hills, 4,000—6,000 ft.—Europe, temperate Asia and America, Hongkong.

In Europe, the dried plant is given in dropsy.

Catalan: Vara d'or—; *Chinese:* Chi Nu, Lui Chi Mu—; *English:* Aaron's-rod, Banwort, Common Golden Rod, Golden Rod, Woundwort—; *French:* Herbe des Juifs, Verge d'or, Verge dorée—; *German:* Edelmindkraut, Goldenmundkraut, Goldenrautenkraut, Goldraute, Goldrute, Goldstengel, Gueldenwunderkraut, Gueldenwundkraut, Hainschwung, Heidnischwundkraut, Heilwundkraut, Klapperschlangenkraut, Nachtheil, Sankt Peterskraut, Sankt Petersstab, Stockschwungkraut, Stopfzu, Stoppkehrt, Stopploch, Wisselnkraut, Wunderkraut, Wundkraut—; *Indo China:* Hoang Kam phuong, Nhat chi hoang hoa—; *Italian:* Erba pagana, Verga d'oro—; *Malaya:* Chec noo—; *Portuguese:* Vara d'oiro—; *Roumanian:* Splinuta de aur, Varga d'aur—; *Russian:* Solotoschnik—; *Spanish:* Vara de oro—; *Swedish:* Gulbris—.

GRANGEA Adans.

Prostrate or suberect villous herbs. Leaves alternate, pinnatifid. Heads subglobose, terminal or leaf-opposed, shortly peduncled, heterogamous; outer flowers female, fertile, 1-many-seriate; those of the disk hermaphrodite, fertile. Involucre broadly campanulate; bracts few-seriate, slightly unequal, the exterior herbaceous. Receptacle convex or conical, naked. Corollas of female flowers filiform, shorter than the styles, the exterior 2-fid at the apex, the interior sometimes 3-4-fid; corollas of hermaphrodite flowers regular, with a slender

tube and a campanulate limb 4-5-fid at the apex. Anther-bases obtuse. Style-arms of hermaphrodite flowers flattened, cuneate, obtuse or with triangular points. Pappus a short tube with fimbriate mouth. Achenes somewhat compressed or subterete, produced at the apex into a cartilaginous ring.—Species 2.—Palæotropics.

G. maderaspatana Poir. is used medicinally in Indo China, Java, Madagascar.

1. **Grangea maderaspatana** Poir. Encycl. Méth. Suppl. II (1811) 825.—*Artemisia maderaspatana* Roxb. Fl. Ind. III (1832) 422.—Plate 520.

Annual; stems many, prostrate, spreading from the centre, 10-30 cm. long, hairy with soft white hairs. Leaves numerous, sessile, 2.5-6.3 cm. long, sinuately pinnatifid with 2-4 pairs of opposite or subopposite lobes smaller towards the base, the terminal lobe the largest, all coarsely serrate-dentate, pubescent on both surfaces. Heads globose, 6-8 mm. diam., solitary or 2-nate, on short leaf-opposed peduncles; flowers yellow. Involucral bracts elliptic, obtuse, rigid, densely pubescent. Pappus a short tube with fimbriate mouth. Achenes glandular, 2.5 cm. long including the pappus-tube.

Distribution: Throughout India, Baluchistan, Ceylon.—Tropical and subtropical Asia and Africa.

The herb has a very bitter bad taste; antipyretic; good for pain in the eyes and ears.—The root is an appetiser; astringent to the bowels, diuretic, anthelmintic, emmenagogue, galactagogue, stimulant; useful in griping, in troubles of the chest and lungs, headache, paralysis, rheumatism in the knee joint, piles, pain in the muscles, diseases of the spleen and the liver, troubles of the ear, the mouth and the nose; lessens perspiration (Yunani).

The leaves are regarded as a valuable stomachic and to possess deobstruent and antispasmodic properties, and are prescribed in infusion and electuary in cases of obstructed menses and hysteria. They are also sometimes used in preparing antiseptic and anodyne fomentations.

The juice of the leaves is employed as an instillation for earache.

In Indo China, the leaves are considered as an excellent stomachic; they are also used as an antiseptic in fomentation. A decoction of the roasted leaves is given in cough and is used as an emmenagogue.

In Madagascar, the leaves are used as a stomachic and antispasmodic.

Arabic: Afsantin, Khatareka—; *Bengal:* Namuti—; *Betsileo:* Angea—; *Canarese:* Dovana—; *Gujerati:* Jhinkimundi, Nahanigorakhamundi—; *Hindi:* Mukhatari, Mustaru—; *Hova:* Motomaso, Voamontomosa—; *Indo China:* Cai dong, Cuc rai, La chan vit—; *Malayalam:* Nelampala—; *Marathi:* Mashipatri—; *Persian:* Baranjasifkowhi, Murava—; *Sinhalese:* Velkolondu—; *Tamil:* Mashipatri—; *Telugu:* Save—; *Urdu:* Afsantin—.

ASTER Linn.

Herbs or shrubs. Leaves alternate. Heads solitary corymbose or panicled, heterogamous, rayed (rarely discoid); ray-flowers hermaphrodite, 1-2-seriate, fertile; ligule elongate, white, blue or purple; disk-flowers hermaphrodite, fertile, tubular, yellow, 5-cleft. Involucre campanulate or hemispheric; bracts few- or many- seriate, outer smaller or larger; receptacle flat or convex. Anther-bases obtuse, entire. Style-arms of hermaphrodite flattened, tips lanceolate, long or short. Achenes compressed, faces with 1-3 ribs or 0; pappus-hairs few or copious, scabrid, outer sometimes shorter, rigid and paleaceous.—Species 400.—America, Asia, Africa, Europe.

The genus is not therapeutically defined.

The following species are used medicinally in China—*A. fastigiatus* Fisch. and Max., *A. scaber* Thunb., *A. tatericus* Linn., *A. trinervius* Roxb.—; in Indo China—*A. tataricus* Linn., *A. trinervius* Roxb.—; in South Africa—*A. asper* Linn., *A. erigeroides* Harv., *A. filifolius* Vent., *A. hispidus* Bkr., *A. muricatus* Less., *A. serrulatus* Harv.—.

1. **Aster trinervius** Roxb. Hort. Beng. 61; Fl. Ind. III (1832) 433.

Glabrous or scaberulous, slender, leafy. Stem 60-90 cm., rarely almost glabrous, grooved, sometimes almost hispid. Leaves 2.5-10 cm., very variable, sessile or petioled, lanceolate obtuse acute or acuminate, coarsely serrate, base rounded or acute, usually scabrid on both surfaces. Heads corymbose, 8-13 mm. diam., involucral bracts linear obtuse or acute, ligules 12-15, short, white narrow. Achenes hairy, 2.5 mm.; pappus 5 mm., reddish with a few short slender outer hairs.

Distribution: Central and W. Himalaya, Nepal, Sikkim, Mishmi Mts., Khasia Hills, Japan, N. China.

The Chinese use the root for coughs and pulmonary affections, and in the treatment of malaria and hæmorrhages.

Cantonese: Tsz uen—; *Chinese:* Ma Lan—; *Indo China:* Ma lan—; *Malaya:* Tsz yoon—.

Erigeron Linn.

Perennial or annual herbs. Leaves alternate. Heads of flowers solitary or variously corymbose or panicled, heterogamous; ray-flowers female, usually 2-many-seriate, fertile; disk-flowers hermaphrodite, fertile (rarely sterile). Involucre hemispheric or campanulate; bracts sub-2-seriate, narrow, usually numerous, slightly unequal. Receptacle flat or scarcely convex, naked or rarely foveolate. Corollas of the female flowers violet-purple or white, the exterior narrowly ligulate, the interior sometimes tubular, filiform, scarcely dentate; corollas of hermaphrodite flowers yellow, regular, tubular, the limb slightly enlarged, with 5 (rarely 4) short teeth. Anther-bases obtuse. Style-arms of hermaphrodite flowers more or less flattened, the tips lanceolate. Pappus 1-seriate, of many long hairs, or sometimes 2-seriate, the outer row of a few short hairs or bristles. Achenes compressed, often narrow, the margins usually nerviform, the faces without nerves or with 1-2 nerves.—Species 180.—Cosmopolitan, especially North America.

1. Heads 6-13 mm. diam. .... 1. *E. asteroides.*
2. Heads 4-6 mm. diam. .... 2. *E. canadensis.*

The leaves are tonic, diuretic and astringent.

The following species are used medicinally in Indo China—*E. ægyptiacus* Linn.—; in North America—*E. annuus* Pers., *E. canadensis* Linn., *E. philadelphicus* Linn.—; in La Reunion—*E. canadensis* Linn.—; in South Africa—*E. canadense* Linn.—.

1. **Erigeron asteroides** Roxb. Fl. Ind. III (1832) 432.—PLATE 519A.

A coarse annual 30-60 cm. high; stem much-branched, clothed with spreading hairs. Leaves sessile (or the radical shortly petiolate), 2.5-5 cm. long, oblong or obovate-oblong, those of the stem auriculate, ½-amplexicaul, obtuse, all toothed or lobulate, hairy on both sides. Heads 6-13 mm. diam., few on long peduncles. Involucral bracts 1-2-seriate, subequal, very narrow, much shorter than the pappus, bristle-pointed and with scarious margins. Ray of 1-2 rows of ligulate bluish violet spreading flowers, longer than the involucral bracts, then several rows of filiform female flowers appearing white in the fresh plant; disk composed of yellow hermaphrodite perfect flowers with tailless anthers. Pappus pinkish white. Achenes much flattened, ellipsoid or slightly obovoid, 0.85 mm. long, glabrous or nearly so, yellowish.

Distribution: Throughout India, Ceylon.

This plant is a stimulant and diuretic, and is given in febrile conditions.

Bombay: Maredi, Sonsali—; *Ceylon:* Narakaramba—.

2. **Erigeron canadensis** Linn. Sp. Pl. (1753) 863.

An erect much-branched annual, up to 0.9 m. high, pubescent or nearly glabrous, branches very slender. Leaves 2.5-7.5 cm., narrowly linear or linear-lanceolate, acuminate, entire or remotely toothed, glabrous or pilose. Heads 4-6 mm. diam., peduncled in elongate branched panicles. Involucral-bracts narrowly lanceolate, acuminate, glabrous or pilose outside, margins scarious. Ligules

pale rose or purplish, scarcely exceeding the pappus. Achenes 4 mm., narrow, flat, glabrous. Pappus almost white, turning reddish.

Distribution: Punjab Plain and W. Himalaya up to 3,000 ft., Upper Gangetic Plain. —Occurs in all warm countries. Believed to be indigenous in N. America.

The plant is styptic, diuretic, and astringent to the bowels (Ayurveda).

It is used in America as a stimulant, astringent, and hæmostatic. It has been found a useful remedy in the treatment of diarrhœa and dysentery.

English: Cobblers' Pegs, Canada Fleabane, Canadian Fleabane, Squaw-weed—; *French:* Vergerette de Canada, Vergerole—; *Italian:* Impia—; *La Reunion:* Fausse camomille—; *Sanskrit:* Jarayupriya, Makshikavisha, Palita—;

Blumea DC.

Annual or perennial, glandular, pubescent or woolly herbs. Leaves alternate, usually toothed or lobed, sessile or petiolate, rarely decurrent. Heads of moderate size, solitary, panicled or fascicled, rarely racemose, heterogamous, disciform, purple, rosy or yellow. Outer flowers many-seriate, female, fertile; disk-flowers hermaphrodite, few, fertile (rarely sterile). Involucre ovoid or campanulate; bracts many-seriate, imbricate, narrow, acute, herbaceous or soft, the outer gradually smaller. Receptacle flat, naked. Corollas of female flowers filiform, minutely 2-3-toothed, those of the hermaphrodite flowers regular, tubular, slender, with a slightly enlarged 5-toothed limb. Anther-bases sagittate; tails usually slender. Style-arms of the hermaphrodite flowers flattened or almost filiform, somewhat acute, papillose on the back, rarely connate so as to form one undivided style. Pappus slender, 1-seriate, usually caducous. Achenes small, subterete or angled, often ribbed, glabrous or pilose.—Species 80.—Palæotropics, South Africa.

A. Heads many, villous, small, 6-13 mm. diam. .... 1. *B. lacera.*
B. Heads many, small, 6-13 mm. diam. .... 2. *B. eriantha.*
C. Heads very numerous. Pappus red
  1. Leaves 20-45 cm. long .... 3. *B. densiflora.*
  2. Leaves 10-20 cm. long .... 4. *B. balsamifera.*

The leaves are stomachic, antispasmodic and diaphoretic.

The following species are used medicinally in China, the Philippine Islands, Borneo—*B. balsamifera* DC.—; in Indo China —*B. balsamifera* DC., *B. myriocephala* DC.—; in Malaya—*B. chinensis* DC.—.

OFFICIAL :—The leaves of *B. balsamifera* DC. (Holland).

1. **Blumea lacera** DC. in Wight Contrib. (1834) 14.—PLATE 521A.

Annual, with a strong odour of turpentine; stem erect, 0.3-0.9 m. high, ash-coloured, usually densely glandular-pubescent. Leaves 3.8-12.5 by 2.2-6.3 cm., the lower petioled, often incised or lyrate, the upper subsessile, elliptic-oblong or obovate, obtuse or subacute, finely silky-pubescent on both sides, sharply serrate-dentate, base much tapered. Heads 6-8 mm. diam., numerous in short axillary cymes and terminal spiciform panicles; flowers yellow. Corolla-lobes of hermaphrodite flowers nearly glabrous. Involucral bracts densely silky-villous, the outer bracts somewhat herbaceous, linear-lanceolate, the inner linear, scarious, with a green midrib. Receptacle glabrous. Pappus white. Achenes not ribbed, small, oblong, sub-4-gonous.

Distribution: Throughout the plains of India, Ceylon.—China, Malaya, Australia, tropical Africa.

The plant is hot, pungent, bitter; antipyretic; cures bronchitis, blood diseases, fevers, burning sensation, thirst.—The root kept in the mouth cures diseases of the mouth (Ayurveda).

The expressed juice of the leaves is used as an anthelmintic, febrifuge, astringent, and diuretic; mixed with black pepper, it is given in bleeding piles.

The root mixed with black pepper is given in cholera.

Arabic: Kamafitus—; *Bengal:* Burasuksung, Kukurmuta, Kukursunga—; *Bombay:* Nimurdi—; *Burma:* Maiyagan—; *Deccan:* Divarimulli, Janglikasni, Janglimulli—; *Gujerati:* Kalhar, Kokarunda, Pilokapurio—; *Hindi:* Janglimuli, Kakronda, Kukkurbanda—; *La Reunion:* Lastron bâtard—; *Marathi:* Bhamurda, Kukurbanda—;

Porebunder: Kapurio, Pilichanchadamari—; *Sanskrit:* Kukkuradru, Kukundara, Mriduchhada, Sukshmapatra, Tamrachuda—; *Tamil:* Kattumullangi, Narakkarandai—; *Telugu:* Advimulangi, Karupogaku.—.

2. **Blumea eriantha** DC. in Wight Contrib. (1834) 15.—PLATE 522A.

Herbaceous; setm erect, terete, slender, 30-45 cm. high, more or less pubescent, dichotomously branched. Leaves 2.5-7.5 by 1.3-3.8 cm., irregularly apiculately toothed, the teeth sometimes alternately long and short especially in the upper leaves, the lower leaves petioled, obovate, subobtuse, the upper sessile or nearly so, elliptic-oblong, acute, all pubescent or sometimes silky-villous. Heads 6-8 mm. diam., on the long slender silky-hairy peduncles of dichotomous cymes. Corolla-lobes of hermaphrodite flowers hairy. Receptacle glabrous. Involucral bracts linear, clothed with long silky hairs. Achenes minute, angled, with a few hairs on the angles.

Distribution: Bundelkhand, Konkan, Deccan, W. Ghats, S. M. Country, probably W. Coast of Madras Presidency.

The juice of the plant is administered as a carminative, and the herb used along with the leaves of *Vitex Negundo* and *Careya arborea* for fomentations. A warm infusion is given as a sudorific in catarrhal affections; cold it is considered to be diuretic and emmenagogue.

Marathi: Nimurdi—.

3. **Blumea densiflora** DC. Prodr. V, 446.—PLATE 521B.

Stem stout, panicle and leaves beneath densely tomentose or clothed with thick white felted wool. Leaves 20-45 cm., broadly elliptic or elliptic-lanceolate narrowed into a long winged sometimes appendaged petiole puberulous above, serrate-toothed or pinnatifid. Heads 6 mm. diam., sessile in rounded clusters on a large branched panicle, involucral bracts narrow, rather rigid, receptacle narrow glabrous, corolla-lobes of hermaphrodite hairy, achenes 10-ribbed pubescent, pappus red.

Distribution: Tropical Himalaya, Sikkim, Assam, Mishmi and Naga Hills, Khasia Hills, 2,000—4,000 ft., Tavoy.—Malay and Fiji Islands.

The plant yields camphor.

It was found ineffective as an anthelmintic (Caius and Mhaskar).

Burma: Phummasin, Pungmatheing—.

4. **Blumea balsamifera** DC. Prodr. V, 466.—PLATE 522B.

An evergreen shrub sometimes growing out into a small tree, all softer parts densely appressed-villous. Leaves lanceolate to oblong-lanceolate, pinnately 6-2-foliolate on the densely pubescent petiole of 8-17 mm. length, acuminate at both ends, the lower ones 7.5-12.5 cm. long, repand-toothed, membranous, but thickly silky-villous. Flower-heads rather small, shortly peduncled, forming smaller or larger panicles in the axils of the upper leaves and gradually transformed into terminal large tomentose panicles; involucral bracts silky pilose, linear-subulate, acuminate, about 6.3 mm. long, the outer ones gradually shorter; florets numerous, yellow. Achenes minute, glabrous, the pappus soft, 6.3-7.5 mm. long, pinkish pale-coloured.

Distribution: Tropical Himalaya, Nepal, Sikkim, Assam, Khasia Hills, Chittagong, Burma, Malay Peninsula.—Java.

A warm infusion acts as a pleasant sudorific, and the decoction is a useful expectorant.

In Indo China, the leaves are considered to be stomachic, and antispasmodic, and they are used in leucorrhœa. In Cambodia, they are applied externally in scabies.

Taken internally the decoction of the leaves is an excellent diaphoretic in bronchitis. In Java and China, it is given as an expectorant. It is stomachic, antispasmodic, emmenagogue, antiseptic. As a fumigation it is much used in the Philippine Islands for rheumatism and headache.

The plant has been found ineffective as an anthelmintic (Caius and Mhaskar).

Burma: Ponmathein—; *Cambodia:* Baimat—; *China:* Ai Na Hsiang—; *Dutch India:* Semboeng oetan—; *English:* Nagal Camphor—; *French:* Camphrée—; *Gujerati:* Kalahad—; *Hindi:* Kakaronda—; *Ilocano:* Sobsob—; *Indo China:* Bai mat, Dai bi, Tu

bi xanh—; *Marathi:* Bhangaruda—; *Pampangan:* Sambon—; *Tagalog:* Sambon, Sambong, Sambung—; *Visayan:* Alibhon, Alibun, Ayoban, Gabuen, Gintingintin, Guintinguintin, Guitinguitin, Hamlibon, Lacadbulan, Lacdanbulan, Lalacdan—.

PLUCHEA Cass.

Shrubs or undershrubs (rarely herbs) tomentose or glutinous. Leaves alternate. Heads small, in terminal leafless corymbs, or large and subsolitary, heterogamous, disciform, white, yellow, or lilac; outer flowers female, fertile, many-seriate; disk-flowers hermaphrodite, few, sterile. Involucre ovoid or broadly campanulate; bracts ovate or lanceolate, usually broad, dry, rigid. Receptacle flat, naked. Corollas of female flowers filiform, shorter than their styles, 3-fid or minutely toothed at the apex, those of hermaphrodite flowers regular, tubular, with a slightly enlarged limb, 5-fid at the apex. Style-arms or hermaphrodite flowers filiform, entire or 2-fid. Anther-bases sagittate, the cells tailed. Pappus-hairs slender, 1-seriate, free, or in the sterile achenes very many, more or less connate at the base.—Species 30.—Tropics and subtropics.

1. Leaves obovate or oblanceolate, subserrate, glabrous .... 1. *P. indica.*
2. Leaves sessile, very coriaceous, oblong or oblanceolate, hoary-pubescent .... 2. *P. lanceolata.*
3. Leaves pinnatifid .... 3. *P. pinnatifida.*

Root diaphoretic, astringent and febrifuge. Leaves aperient. Herb carminative.

The following species are used medicinally in Indo China—*P. eupatorioides* Kurz., *P. indica* Less., *P. polygonata* Gagnep., *P. pteropoda* Hemsley—; in Brazil—*P. quitoc* DC.—.

1. **Pulchea indica** Less. in Linnaea VI (1831) 150.—PLATE 523A.

An evergreen large shrub, all parts glabrous or the young shoots puberulous. Leaves obovate to cuneate-obovate, shortly petioled to almost sessile, bluntish to acute, 2.5-5 cm. long, membranous, sinuate-toothed, glabrous. Flower-heads small, sessile or nearly so, forming usually glabrous terminal corymbs; bracts rigid, the outer ones ovate

and bluntish, the innermost ones linear, acute, about 4 mm. long; florets lilac. Achenes minute, the pappus white.

Distribution: Salt marshes from the Sundribuns to Malacca and Penang.—Malay Archipelago, China.

The root and leaves are used in Patna as astringents and antipyretics.

In Indo China, the roots in decoction are prescribed in fevers as a diaphoretic, and an infusion of the leaves is given internally in lumbago.

Bengal: Kukronda, Munjurukha—; *Burma:* Kayu—; *Cambodia:* Pras anlok—; *Iloilo:* Tulolalaqui—; *Indo China:* Cuc tan, Cuc tan o, La luc, Pros anloc, Tu bi—; *Malay:* Poko beluntas—; *Tagalog:* Lagundilati—.

2. **Pluchea lanceolata** C. B. Clarke Comp. Ind. (1876) 94. —Plate 523B.

An erect undershrub; stem and branches terete, slender, softly ashy-pubescent. Leaves sessile, very coriaceous, 2.5-5.7 by 0.6-1.3 cm., oblong or oblanceolate, obtuse, apiculate, narrowed at the base, finely ashy-pubescent on both sides, entire; main nerves prominent. Heads in compound corymbs. Involucre contracted at the mouth; outer bracts 2-3-seriate, oblong, very obtuse, pubescent, usually tinged with purple; the innermost bracts linear, subacute, few. Pappus-hairs distinctly connate at the base.

Distribution: Punjab, Gangetic Plain as far as Cawnpore, Sind.—Afghanistan, N. Africa.

The leaves are aperient.

Agra: Chotikalia—; *Aligarh:* Banserai—; *Cawnpore:* Sorahi—; *Gujerati:* Rasana, Rashana—; *Hindi:* Rasana, Rashana—; *Marathi:* Rasna, Rashna—; *Punjab:* Marinandai, Rasana, Reshæ, Reshambuti, Reshami, Sarmei—; *Pushtu:* Marwande—; *Rajputana:* Chotakalia—; *Sanskrit:* Rasna—; *Sind:* Kurasanna.

3. **Pluchea pinnatifida** Hook. f. in Hook. Ic. Pl. 1156.

A much-branched sticky shrub, otherwise glabrous, with thin leafy branchlets. Leaves pinnatifid, 1-2.5 cm., divided almost to the

mid-rib into few, shortly linear, obtuse, slightly fleshy lobes. Peduncles on the spikes of the branches few, 1-headed, 1-2.5 cm. long. Involucre campanulate, 9 mm. long; bracts numerous, narrow, somewhat acute, pluriseriate, the external ones getting gradually shorter. Receptacle naked. Female flowers pluriseriate; corolla very narrow, subtridentate, not exceeding the pappus. Style exserted, with filiform branches. Hermaphrodite flowers several in the centre of the head; corolla narrowly tubular, shortly 5-fid at the apex. Anthers very shortly tailed at the base. Style-arms (always?) linear, erect, connivent (or connate?). Achenes small, villosulous. Pappus-hairs few, narrow, scarcely serrulate.

Distribution: Baluchistan.—Somaliland.

In Ormara, the plant is rubbed on to inflamed or wounded places (Hughes-Buller).

The stems are employed by the Somalis for the cure of almost all diseases; but especially for pain in the bowels, anorexia, and debility after fevers.

Ormara: Majassar, Zika—.

SPHAERANTHUS Vaill. ex Linn.

Divaricately branched herbs. Leaves alternate, toothed, decurrent along the stem. Heads small, very numerous, sessile, crowded on a large common receptacle into more or less globose terminal compound heads with or without a general involucre of empty bracts at the base; outer flowers, female, few or many, fertile; disk-flowers hermaphrodite, solitary or few, fertile or sterile. Involucre narrow; bracts few or many, acute, subpaleaceous, slightly unequal. Receptacle small, naked. Corollas of female flowers slender, tubular, minutely 2-3-toothed, those of the hermaphrodite flowers regular, the tube thickened, the limb 4-5-toothed. Anther-bases sagittate, auricles acute or tailed. Style-arms of hermaphrodite flowers filiform or connate. Pappus 0. Achenes oblong, compressed. Species 25—Palæotropics.

S. africanus Linn. is used medicinally in Indo China, *S. indicus*

Linn. in Indo China, the Philippine Islands, the Malay Archipelago, Gambia.

1. **Sphaeranthus indicus** Linn. Sp. Pl. (1753) 927.—Plate 524.

A much-branched herb about 30 cm. high; stem and branches cylindric, with toothed wings, more or less glandular hairy. Leaves sessile, decurrent, 1-5 by 0.45-2.2 cm., obovate-oblong, rounded or subacute, glandular-hairy, spinous-serrate or dentate, narrowed at the base. Heads 1-1.6 cm. diam., compound, globose-ovoid, ebracteate, on solitary glandular peduncles with toothed wings; flowers purple. Involucral bracts linear, acuminate, pubescent and ciliate near the ends. Achenes glabrous, stalked.

Distribution: Throughout India, Ceylon.—Malay Archipelago, China, Africa.

The herb is bitter and hot with a sharp sweet taste; laxative, digestible, tonic, fattening, alterative, anthelmintic, alexipharmic; used in insanity, tuberculous glands, indigestion, bronchitis, diseases of the spleen, elephantiasis, anæmia, pain in the uterus and vagina, piles, strangury, biliousness, epileptic convulsions, asthma, leucoderma, dysentery, vomiting, urinary discharges, pain in the rectum, looseness of the breasts, hemicrania (Ayurveda).

The herb has a bitter sharp flavour with a bad taste; tonic, laxative, emmenagogue; increases the appetite; enriches the blood; lessens inflammation; cools the brain and gives lustre to the eye; good for sore eyes, jaundice, scalding of urine, gleet, biliousness, boils, scabies, ringworm of the waist, diseases of the chest.—The oil from the root is aphrodisiac, used in prolapsus ani (Yunani).

The root and the seeds are considered as anthelmintic.

The powdered root is given as a tonic. The bark, ground and mixed with whey, is a valuable remedy for piles.

In the Punjab, the flowers are highly esteemed as alterative, dipurative, cooling and tonic (Stewart).

Among the Mundas of Chota Nagpur the whole plant bruised, is thrown into water to kill fish. It is stuffed into crabs' holes to

kill them. The plant is pounded with a little water and the juice is expressed and used as a styptic. The juice of the fresh leaves, similarly obtained, is boiled with a little milk and sugarcandy, and drunk against cough.

In Java, the plant is considered as a useful diuretic.

This small plant was used in the form of a decoction as a diuretic in urethritis. The result was unsatisfactory (Koman).

Arabic: Kamazariyus, Kamdaryus—; *Bengal:* Chagulnadi, Ghorkmundi, Murmuriya—; *Bombay:* Gorakhmundi, Mundi—; *Ceylon:* Mudamahana—; *Cutch:* Munderi—; *Deccan:* Mundhri, Mundi—; *Gujerati:* Bodiokalara, Gorakhamundi, Mundi—; *Hasada:* Najompuru, Puru—; *Hindi:* Gorakmundi, Mundi—; *Malayalam:* Adakkamanian, Attakkamanni, Mirangani—; *Marathi:* Barasavodi, Gorakhamundi—; *Mundari:* Kutunaara—; *Naguri:* Kardanidudu-muritasad—; *Persian:* Kamaduriyus, Randarummitalkha—; *Porebunder:* Gorakhamundi—; *Punjab:* Ghundi, Gurukmundi, Khama-drus, Mundi, Mundibuti, Zakhmihaiyat—; *Sadani:* Khutlasag—; *Sanskrit:* Alambusha, Aruna, Avyatha, Bhikshu, Bhukadambika, Bhukanda, Bhutaghni, Boda, Chhitragranthika, Kadambapushpa, Kadambapushpika, Krodachuda, Kumbhala, Lochani, Lotani, Maha-mundi, Mahashvranika, Mata, Mundakhya, Mundi, Mundirika, Nadikadamba, Nilakadambika, Palankasha, Parivraji, Pravrajita, Shravana, Shravanashirshika, Shravani, Sthavira, Tapasvini, Tapod-hana, Vikacha, Vridha—; *Santal:* Belaunja—; *Tagalog:* Sambong-gala—; *Tamil:* Kottakkarandai—; *Telugu:* Bodasoram, Bodata-rapu—; *Urdu:* Kamdaryus, Mundi—.

ANAPHALIS DC.

Perennial, rarely annual, erect, cottony or woolly, rarely pubes-cent or glabrate herbs. Leaves altetrnate. Heads small, corymbose, heterogamous with the female flowers outermost, or unisexual or subdioecious, disciform; female flowers numerous, filiform, fertile, 2-4-toothed.; hermaphrodite flowers usually sterile, tubular, limb subcampanulate 5-fid. Involucre campanulate turbinate or sub-globose; bracts many-seriate, scarious, inner with a petaloid limb,

outer shorter, outermost woolly; receptacle naked. Anther-bases sagittate; auricles connate, tailed. Style of hermaphrodite filiform, obtuse, subcapitate or 2-cleft. Achenes very small, oblong; pappus hairs of female 1-seriate, slender, scabrid, quite free and caducous, of hermaphrodite often thickened at the tips.—Species 50.—Asia, Europe, America.

In the Nilghiris several species are used for cut wounds.

1. **Anaphalis neelgerriana** DC. Prodr. VI, 272; Wight Ic. t. 478.—PLATE 525.

At its best 0.9 or 1.2 m. high and as broad, with numerous ascending, usually opposite branches, clothed below by the dead leaves; bark of stem rough and corky. Leaves bluish white, 6 by 1.25 mm., coated with soft white cotton closely appressed to the surface, with recurved margins and one central vein; when young erect, later spreading, and finally depressed close against the axils and persistent there, very numerous and close set. Heads in open corymbose panicles 5-7.5 cm., across terminating erect branches 10-12.5 cm. high, clothed to the top with closely appressed leaves; disk 4-5 mm. surrounded by a white rim of involucral bracts 1.5 mm.

Distribution: Nilgiris, 7,000—8,250 ft.

The fresh leaves are bruised and applied to the wound as a plaster.

Nilghiris: Katplaster—; *Sanskrit:* Raktaskandaṇa, Vrana pata—.

GNAPHALIUM Linn.

Hoary or woolly herbs. Leaves alternate, usually quite entire. Heads small, in terminal or axillary corymbs or fascicles, heterogamous, disciform; outer flowers female, fertile, 2-many-seriate; disk-flowers hermaphrodite, fewer, fertile. Involucre ovoid or campanulate; bracts many-seriate, imbricate, all scarious, or with a white, yellow, or brown, more or less scarious blade. Receptacle naked or pitted. Corollas of female flowers filiform, minutely dentate or shortly 3-4-fid at the apex, those of the hermaphrodite flowers

regular, tubular, slender, the limb slightly enlarged, shortly 5-fid. Anther-bases sagittate, finely tailed. Style-arms of hermaphrodite flowers slender, truncate. Achenes oblong or obovate, subterete or slightly compressed. Pappus-hairs 1-seriate, slender or thickened towards the tip, separately caducous or more or less connate at the base into a ring. Species 260.—Cosmopolitan.

The plant is astringent and vulnerary.

The following species are used medicinally in Europe—*G. luteo-album* Linn., *G. norvegicum* Gunner, *G. supinum* Linn., *G. sylvaticum* Linn., *G. uliginosum* Linn.—; in China—*G. multiceps* Wall.—; in North America—*G. margaritaceum* Linn., *G. obtusifolium* Linn.—; in California—*G. decurrens* Ives.—; in South Africa—*G. luteo-album* Linn., *G. undulatum* Linn.—.

OFFICIAL:—The flowers of *G. dioicum* Linn. (France).

1. **Gnaphalium luteo-album** Linn. Sp. Pl. (1753) 851. —PLATE 526B.

Herbaceous, 15-45 cm. high, sometimes woody at the base, erect, ascending or decumbent; stem simple or branched and as well as the branches softly woolly. Leaves sessile, 2.5-6.3 by 0.3-1.3 cm., spathulate-oblong or linear-oblong, usually obtuse, sometimes mucronate, the upper ½-amplexicaul, smaller than the lower, all woolly on both surfaces, especially the lower one (the upper surface sometimes glabrate), entire or very rarely obscurely toothed. Flowers in dense leafless corymbose clusters of yellow glistening heads. Involucral bracts shining, straw-coloured, the outer ovate, subobtuse, the innermost linear, acute or subobtuse, all with a subherbaceous nucleus near the base, thinly scarious and transparent in the upper part. Pappus shorter than the involucre. Achenes oblong, papillose.

Distribution: Throughout India.—Most hot and warm temperate countries.

The leaves are used in the Punjab as an astringent and vulnerary.

The Sutos burn the plant in the sickroom to drive away sickness.

Afrikaans: Roerkruid—; *Burma:* Byaingchepiu—; *English:* Jersey Cudweed—; *Hova:* Ahitrakohovavy, Tranomandrita—;

Igorrote: Onanat—; *La Reunion:* Immortelle marronne—; *Punjab:* Balraksha—; *South Africa:* Cudweed—; *Suto:* Manku, Musuwane—.

INULA Linn.

Herbs, rarely shrubs. Leaves radical and alternate. Heads at the ends of the branches, solitary, corymbose, or panicled, heterogamous, rayed (rarely disciform); ray-flowers female, fertile, 1-many-seriate; disk-flowers hermaphrodite, tubular. Involucre hemispheric oı campanulate (rarely ovoid); bracts many-seriate, imbricate, the inner usually rigid and narrow, the outer herbaceous, the outermost often foliaceous. Receptacle flat or tumid, pitted or areolate. Corollas of female flowers ligulate, the ligules long, short, or minute, yellow or white, 3-toothed; corollas of the hermaphrodite flowers regular, tubular, yellow, the limb elongate, slightly enlarged, 5-toothed. Anther-bases sagittate, with rather small auricles; tails long, simple or branched. Style-arms of hermaphrodite flowers linear, slightly flattened, broader upwards, obtuse. Achenes subterete, ribbed. Pappus-hairs few or many, 1-2-seriate, rather short, smooth, scabrid or bearded.—Species about 100.—Europe, Asia, Africa.

A. Tall, stout herbs. Heads large, solitary or racemose
  a. 30-150 cm. high .... 1. *I. racemosa.*
  b. 30-60 cm. high .... 3. *I. royleana.*
B. Heads turbinate, terminating numerous slender branches .... 2. *I. graveolens.*
C. Heads solitary .... 4. *I. grantioides.*

The root is tonic, stomachic, alterative, diuretic, diaphoretic, and carminative.

The following species are used medicinally in Europe—*I. conyza* DC., *I. crithmoides* Linn., *I. germanica* Linn., *I. graveolens* Desf., *I. helenium* Linn., *I. viscosa* Ait.—; in China and Indo China—*I. britannica* Linn.—; in Malaya—*I. japonica* Thumb.—; in North America—*I. helenium* Linn.—.

OFFICIAL:—The root of *I. Helenium* Linn. (Holland);= *Corvisartia Helenium* Merat (Portugal).

1. **Inula racemosa** Hook. f. Fl. Brit. Ind. III, 292; Blatter Beautiful Fl. Kashmir I (1927) 160, pl. 29, fig. 5.—PLATE 527.

A tall, stout herb. Stem 0.3-1.5 m. high, rough, grooved. Leaves leathery, rough above, densely hairy beneath, crenate. Basal leaves 20-45 by 12.5-20 cm., long-stalked, elliptic-lance-shaped. Stem-leaves oblong, half-stem-clasping, often deeply lobed at the base. Heads many, very large, 3.8-5 cm. diam., in racemes. Outer bracts broad, tips triangular, bent back, inner bracts linear, sharp-pointed. Ligules slender, 1.3 cm. long. Fruit (achene) 4 mm. long, slender, hairless. Pappus 8 mm. long, reddish.

Distribution: Temperate and alpine W. Himalaya 5,000—14,000 ft.

The root has a sharp hot taste; tonic, stomachic, alexiteric, carminative; dispels the effects of shock; cures pains of the heart, spleen, liver, and joints; good for hemicrania, eruptions, inflammations, ear pain, cough, boils.—The seeds are bitter and aphrodisiac; strengthen the hair and prevent it from falling (Yunani).

Used as an expectorant, and as a resolvent in indurations.

In Kashmir, it is mixed with the root of *Saussurea lappa* as an adulterant.

Arabic: Rasan, Zanjabileshami—; *Kashmir:* Poshkar—; *Persian:* Gharsa, Pilgush, Rasan, Zanjabilishami—; *Urdu:* Rasan—.

2. **Inula graveolens** Desf. Fl. Atlantica II, 275.

An annual, slender, much-branched herb, 30-60 cm. high, pubescent and viscid. Leaves small, sessile, linear, acute, 2.5-3.8 cm. by 2.5-4 mm., quite entire, spreading, midrib, strong beneath. Heads rather obconic, 8 mm. diam., terminating slender axillary branchlets. Involucral bracts few, linear, acute or acuminate, erect, outer green, pubescent and glandular; ligules very short. Achenes 6 mm. long, hairy and viscid, contracted at the apex with a cup-shaped tip; pappus-hairs rather coarse, inserted on the edge of the cup, but not united at the base.

Distribution N.-W. India.—Westwards to Spain.

The plant is recommended as a diuretic, useful in calculous diseases (Honigberger).

Cape Peninsula: Khaki Bush, Khaki Weed—; *Malta:* Fleabane, Fulichi, Zghazigha—.

3. **Inula royleana** DC. Prodr. V, 464.

A stout herb, more or less hairy and glandular. Stem 30-60 cm. high, grooved. Leaves rather membranous, blunt, almost hairless or very hairy above, sometimes thickly wooly beneath, finely toothed; basal leaves 15-25 by 10-15 cm., ovate or oblong with a winged petiole; stem-leaves variable, lyrate, with 2 lobes at the base. Heads 7.5-10 cm., diam., solitary on a stout, erect, hairy stalk, hemispheric. Bracts surrounding the flower-head slender, long-pointed. Fruit (achene) 4 mm. long, hairless, slender. Pappus pale red.

Distribution: Temperate W. Himalaya, 7,000—11,000 ft.

The plant is considered poisonous. The root is mixed with that of *Saussurea lappa* as an adulterant.

Kashmir: Zahelniilkohee—.

4. **Inula grantioides** Boiss. Diag. ser. II, fasc. 3 (1856) 14.

Shrubby, perennial, 15-60 cm. glandular-hairy, much branched; stem stout, woody; branches leafy. Leaves 2.5-5 cm. long, variably lobed, the lower leaves petioled, cuneate, shortly 3-lobed, the upper sessile, linear, entire or 2-3-toothed at the apex, all fleshy, glandular and hairy. Heads numerous, 2-3.2 cm. diam., solitary, often furnished with 1 or 2 leafy bracts; peduncles stout, hairy. Involucral-bracts narrowly linear-oblong, subacute, hairy and glandular, the outer the smaller. Ray-flowers ligulate, few, yellow, 1-seriate. Disk-flowers tubular, acutely toothed. Pappus rigid, scabrid, much longer than the achenes, yellowish at first, then reddish. Achenes 2.5-3 mm. long, oblong, strongly ribbed, hispid.

Distribution: Cutch, Sind, Baluchistan, Waziristan.—S. E. Arabia.

In Las Bela, it is given steeped in water to patients suffering from asthma (Hughes-Buller).

Las Bela: Kolmur, Naro—.

PULICARIA Gaertn.

Annual or perennial usually woolly or villous herbs. Leaves alternate, sessile, often cordate-amplexicaul. Heads yellow, solitary,

rayed and heterogamous, or disciform and homogamous; ray-flowers female, 1-2-seriate; disk-flowers slender, hermaphrodite, fertile. Involucre hemispheric or obconic; bracts few-seriate, subequal or the outer shorter, linear, acute or subobtuse. Receptacle flat or sub-convex, pitted. Corollas of female flowers ligulate or tubular, those of the hermaphrodite flowers regular, tubular, slender, the limb elongate, slightly enlarged, shortly 5-fid. Anther-bases sagittate, with minute auricles; tails capillary, simple or branched. Style-arms of hermaphrodite flowers linear, obtuse, slightly flattened, a little broader upwards. Pappus double, the outer row of short jagged teeth or a fimbriate cup; inner of smooth, scabrid or bearded, filiform or flattened hairs, often caducous. Achenes terete or ribbed. Species 30.—Europe, Asia, Africa.

1. Involucral bracts slender. Pappus-hairs bearded, thickened at the tips .... 1. *P. crispa.*
2. Involucral bracts slender. Pappus double, outer of a crown of short scales, inner of slender hairs .... 2. *P. dysenterica.*

P. dysenterica Gaertn. is used medicinally in Europe; *P. capensis* DC. and *P. scabra* Drme. in South Africa.

1. **Pulicaria crispa** Schultz-Bip. in Webb & Berth. Phyt. Canar. II, 223.—PLATE 526A.

A stout shrubby perennial, 0.3-0.6 m. high; branches with ascending very leafy branches. Leaves ½-amplexicaul, 1.3-3.8 cm. long, linear-oblong; margins recurved, dentate, undulate crispate, more or less clothed beneath with white wood. Heads 6-8 mm. diam.; Involucral bracts slender, setaceous, pubescent outside. Ligules shorter than the bracts. Pappus-hairs connate at the base in a ring, white, 3 times as long as the glabrate achenes.

Distribution: Punjab, Upper Gangetic Plain, Bengal, Sind.—Afghanistan, Persia to N. Africa.

In the Salt Range, the dried plant is applied as a vulnerary to bruises, etc., of bullocks (Stewart).

Hindi: Buhrna—; *Punjab:* Bui, Gidi, Phatmer, Sutei—.

2. **Pulicaria dysenterica** Gaertn. Fruct. II, 462.

Perennial, woolly or cottony. Leaves half-amplexicaul, oblong-cordate, waved and toothed. Heads densely woolly; involucral bracts

setaceous; ligules many, long, much exceeding the involucral bracts; pappus dirty white, 4 or 5 times as long as the silky achenes, outer scales lanceolate, free.

Distribution: Kashmir, Westwards to Algeria and Britain.

The root is a popular remedy for dysentery in many countries of Europe.

English: Cammock, Common Yellow Fleablane, Fleabane, Fleabane Millet, Herb Christopher—; *French:* Aunée des prés, Aunée dysentérique, Conyse, Conyse des prés, Enule tonique, Herbe saint Roch, Inule conysiĕre, Inule dysentérique, Pulicaire dysentérique—; *German:* Dumrians—; *Malta:* Common Fleabane, Menta selvatica, Mentastro—.

Xanthium Linn.

Annual coarse rough herbs unarmed, or with 3-fid spines. Leaves alternate, toothed or lobed. Heads monoecious (female and hermaphrodite), axillary, the hermaphrodite in the upper axils, globose, many-flowered, sterile, tubular, 5-toothed, the female 2-flowered, apetalous, fertile. Heads of hermaphrodite flowers: Involucre short; bracts few, 1-2-seriate, narrow. Receptacle cylindric, with hyaline cuneate or linear-spathulate paleæ enclosing the flowers. Corollas tubular, enlarged into a 5-toothed limb. Anthers distinct, bases obtuse, tips mucronate, inflexed; filaments monadelphous. Style undivided, slender, slightly dilated at the apex. Achenes rudimentary. Heads of female flowers: Involucral bracts united into an ovoid 2-beaked herbaceous 2-celled utricle (with 1 flower in each cell), enlarging in fruit, with hooked bristles and with sometimes a few small free outer bracts. Corollas 0. Style-arms exserted from the beaks of the involucre. Pappus 0. Achenes completely enclosed in the indurated cells of the enlarged involucre (like seeds in a capsule), compressed, obovoid, thick.—Species 25.—Probably American.

The leaves are astringent, and diaphoretic. The buds are tonic, diuretic, diaphoretic, and sedative.

The following species are used medicinally in Europe—*X. spinosum* Linn., *X. strumarium* Linn.—; in China, Indo China, and

Malaya—*X. strumarium* Linn.—; in North America—*X. strumarium* Linn.—; in Brazil—*X. macrocarpum* DC., *X. spinosum* Linn.—; in La Reunion—*X. strumarium* Linn.—.

1. **Xanthium strumarium** Linn. Sp. Pl. (1753) 987.—*X. indicum* DC.; Wight Ic. t. 1104.—PLATE 528A.

Annual, unarmed; stem short, stout, slightly branched, rough with short hairs. Leaves numerous, 5-7.5 cm. long and almost as broad as long, broadly triangular-ovate or suborbicular, acute, often 3-lobed, rough with appressed hairs on both sides, irregularly inciso-serrate, somewhat cordate and shortly cuneate at the base; petioles 2.5-7.5 cm. long, hairy. Heads in terminal and axillary racemes, the barren heads rather numerous, crowded at the top of the stem, the fertile heads fewer, axillary. Involucre of fertile heads ovoid in fruit, about 1.6 cm. long, with 2 erect mucronate beaks, pubescent, thickly clothed with usually hooked prickles, 2-celled, hard and tough. Achenes 1.3 cm. long, oblong-ovoid, compressed, glabrous.

Distribution: Throughout India, Ceylon.—Warmer parts of the world. In all probability a native of America.

The plant has a sharp hot acrid taste; cooling, laxative, fattening, anthelmintic, alexiteric, alterative, tonic, digestive, antipyretic; improves appetite, voice, complexion, memory; cures leucoderma, biliousness, poisonous bites from insects, epilepsy, salivation, fever; good in diseases of the teeth in children (Ayurveda).

The root is a bitter tonic, useful in cancer and strumous diseases. The prickly fruit is considered cooling and demulcent and is given in small-pox. In Southern India, the prickly involucre is applied to the ear, or tied in bunch to the ear-ring, to cure hemicrania.

The whole plant is supposed to possess powerful diaphoretic and sedative properties. It is generally administered in the form of decoction, and is said to be very efficacious in longstanding cases of malarious fever.

The herb is prescribed in snake-bite (Sushruta) and scorpion-sting (Charaka, Vagbhata).

In China, the burs are used as a tonic, diuretic, diaphoretic and sedative.

The herb is used as an emollient and astringent in Indo China. An extract of the root is applied to ulcers, boils and abscesses.

In La Reunion, the plant is considered bitter, astringent, antiscrofulous and antiherpetic.

The leaves were formerly official in Europe, and were administered internally in scrofula and in herpes.

In America and Australia, this plant has been observed to prove fatal to cattle and pigs.

The plant is useless in the treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Afrikaans: Boetebossie, Spitzklette—; *Assam:* Agara—; *Bengal:* Banokra—; *Bombay:* Shankeshvara—; *Burma:* Chosa, Koukpin—; *Catalan:* Rapalassa borda—; *Chinese:* Hsi Erh—; *English:* Bur-weed, Clotbur, Cocklebur—; *French:* Glaiteron, Gleitron, Gléteron, Glouteron, Petit glouteron, Grappelles, Herbe aux écrouelles, Lambourde, Lampourde, Lampourde commune, Petite bardane—; *German:* Spitzklette—; *Gujerati:* Gadriyun—; *Hindi:* Banokra, Chhotagokhru, Shankhahuli—; *Indo China:* Gi nhi, Ke, Ke dau ngua, Quyen nhi tu, Tuong nhi—; *Italian:* Lappola minore—; *Kashmir:* Lanetsuru, Tsur—; *La Reunion:* Grosse pagode—; *Malay:* Buah anjang—; *Malaya:* Chong yee chee, Tsang ehr, Tsang yee—; *Marathi:* Dumundi, Dutundi, Sankeshwara; *Punjab:* Chirru, Gudal, Jojre, Kuri, Sungtu, Wangantsuru—; *Pushtu:* Baggiari—; *Roumanian:* Scaietele-popii—; *Sanskrit:* Arishta, Bhulagna, Chanda, Itara, Kambumalini, Kambupuspha, Kiriti, Malavinashini, Mangalyakusuma, Medhya, Pitapushpi, Raktapushpi, Sarpakshi, Shankhagalini, Shankhakusuma, Shankhapuspi, Shankhavha, Shwetakusuma, Sukshmapatra, Supushpi, Vanamalini—; *Sind:* Gokhrukallan—; *South Africa:* Clotbur, Cocklebur, Noogoobur—; *Spanish:* Bardana menor—; *Tamil:* Marlumutta—; *Telugu:* Marulamatangi, Marulutige, Parsvapu, Talnoppi—.

SIEGESBECKIA Linn.

Herbs, usually annual, more or less glandular-pubescent. Leaves opposite, toothed. Heads small, in leafy lax panicles, heterogamous, subradiate, yellow or white; ray-flowers female, fertile, 1-seriate; disk-flowers hermaphrodite, fertile or the inner sterile. Involucre campanulate or hemispheric; bracts few, herbaceous, glandular, the exterior (usually 5) linear-cuneate, spreading, the inner enclosing the ray-flowers. Receptacle small; paleæ membranous, concave, often enclosing the flowers. Corollas of female flowers with a short tube and 2-3-fid limb, those of the hermaphrodite flowers tubular, the limb campanulate and 5-fid, or narrow and 3-4-toothed. Anther-bases entire. Style-arms of hermaphrodite flowers short, flattened, subacute. Pappus 0. Achenes obovoid-oblong, not compressed, often incurved, obtuse.—Species 4.—Tropical and warm temperate.

S. orientalis Linn. is used medicinally in Persia, China, Indo China, Tahiti, Mauritius, La Reunion.

1. **Siegesbeckia orientalis** Linn. Sp. Pl. (1753) 900; Wight Ic. t. 1103.—*S. brachiata* Roxb. Fl. Ind. III (1832) 439.—PLATE 529.

A large annual herb 0.6-1.2 m. high; stem stiff, erect, with horizontal branches below and dichotomously branched ones above; stem and branches tinged with purple, terete, pubescent. Leaves opposite, 5-12.5 by 3.2-7 cm., triangular-ovate, acute or acuminate, deeply and irregularly toothed, the uppermost leaves much smaller and nearly entire, all finely pubescent on both sides, base cuneate, running down wing-like into a somewhat obscure petiole. Heads small, peduncled, in leafy panicles; flowers yellow, those of the ray red beneath. Involucre bracts in 2 rows, very dissimilar; the 5 outer exceeding 1.3 cm. long, linear-spathulate or clavate, horizontally spreading with recurved margins, the upper surface covered with large viscous glandular hairs; the 5 inner bracts short, boat-shaped, obtuse, glandular-hairy on the back, each bract enclosing one of the ray-flowers. Ray-flowers usually 5, ligulate, the ligules recurved, 3-toothed at the apex. Pappus 0. Achenes each enclosed in a boat-shaped bract, glabrous, slightly rough, black.

Distribution: Throughout India, Ceylon.—Most tropical and subtropical regions of both hemispheres.

It has a high reputation as a valuable depurative, and also for its healing properties in gangrenous ulcers and sores. It is strongly recommended in diseases of the urethra.

Externally, a mixture of equal parts of the tincture and glycerine has been tried in Europe with good effect in ringworm and similar parasitic eruptions. Antiseptic properties have been ascribed to the fresh plant, applied to unhealthy ulcers.

In Indo China, the whole plant is prescribed as a cardiotonic.

In La Reunion, the plant is used as a stimulant, diaphoretic, antiscorbutic, and sialagogue. It is considered anthelmintic in small doses.

In Tahiti, the plant enters into the preparation of every cure for wounds, sprains, dislocations, contusions. It is also used to favour menstruation.

China: Hsi Hsien—; *French:* Guérit vite, Herbe divine, Herbe de Flacq, Herbe grasse, Herbe guérit vite, Herbe de lague—; *Garhwal:* Lichkura—; *Gujerati:* Pilibadkadi—; *Indo China:* Cho de, Hy thiem thao, Kinh gioi dat, Luoi dong, Nu ao ria, Riem—; *La Reunion:* Colle-colle, Guérit-vite, Herbe divine, Herbe grasse, Herbe Saint Paul, Souveraine—; *Mundari:* Bindiramkata, Hatubirbiri, Ribribi—; *Sadani:* Latlati—.

ENHYDRA Lour.

Glabrous or scaberulous marsh-herbs. Leaves opposite, sessile. Heads axillary, subsessile, unilateral or in alternate axils, heterogamous, subradiate; ray-flowers female, many-seriate, fertile, ligule minute broad 3-4-toothed; disk-flowers hermaphrodite, fertile or the inner sterile, tubular, limb campanulate 5-fid. Involucral bracts 4, foliaceous, in opposite pairs, 2 outer larger; receptacle convex or conic, pales enclosing the flowers tipped with glandular hairs. Anther-bases obtuse, entire. Style-arms of hermaphrodite obtuse, tips hispid. Achenes oblong, enclosed in the rigid pales, outer dorsally, inner sometimes laterally compressed; pappus 0.—Species 9.—Tropics and subtropics.

The genus is not therapeutically defined.

1. **Enhydra fluctuans** Lour. Fl. Coch. 511.—PLATE 528B.

A marsh herb, usually quite glabrous, sometimes pubescent, glandular; stems 0.3-0.6 m., elongate, simple or divaricating, rooting at the nodes. Leaves sessile, linear-oblong, acute or obtuse, entire or subcrenate, 2.5-7.5 cm., variable in breadth, base narrowed or truncate. Heads axillary and terminal, sessile, 0.8-4.2 cm.

Distribution: E. Bengal, Assam, Sylhet, Malay Peninsula.—Malaya, China.

The leaves are slightly bitter; laxative; cure inflammation, leucoderma, bronchitis, biliousness; good in smallpox (Ayurveda).

The leaves of this aquatic plant are regarded as laxative and useful in diseases of the skin and nervous system. The fresh juice of the leaves, in doses of about a tola, is prescribed by some Kavirajas in Calcutta, as an adjunct to tonic metallic medicines given in neuralgia and other nervous diseases.

The leaves are antibilious. The expressed juice of the leaves is used as demulcent in cases of gonorrhœa; it is taken mixed with milk, either of cow or goat. The leaves are pounded and made into a paste which is applied cold over the head as a cooling agent.

Useful in the torpidity of the liver.

Bengal: Hingcha—; *Hindi:* Haruch—; *Malay:* Chinkro—; *Sanskrit:* Achari, Bramhi, Chakrangi, Helanchi, Hilamochi, Hilamochika, Jalabramhi, Mambi, Matsyakshi, Matsyangi, Mochi, Rochi, Shankhadhara, Trinittaparni, Vishaghni—.

ECLIPTA Linn.

Annual or perennial herbs, diffuse or erect, branched, more or less strigose. Leaves opposite. Heads small, axillary or terminal, peduncled, heterogamous, rayed; ray-flowers female, sub-2-seriate, fertile or sterile, white or yellow; disk-flowers hermaphrodite, fertile. Involucre hemispheric or broadly campanulate; bracts sub-2-seriate, herbaceous, subequal or the inner shorter. Receptacle flat or somewhat convex, the paleæ narrow, enclosing several flowers, the innermost very narrow, or 0. Corollas of female flowers ligulate, spreading, ligules small narrow, entire or 2-toothed; the corollas of

the hermaphrodite flowers regular, tubular, the limb shortly 4-5-fid. Anther-bases obtuse, subentire. Style-arms flattened, terminated by short or triangular obtuse appendages. Achenes of the ray narrow, triquetrous, often empty, those of the disk laterally subcompressed, top entire, toothed or 2-aristate.—Species 4.—Australia, S. America.

E. alba Hassk. is used medicinally in China, Indo China, Malaya, Brazil, Gold Coast, La Reunion.

1. **Eclipta alba** Hassk. Pl. Jav. Rar. (1848) 528 *E. erecta* Linn. Mant. II (1771) 286.—PLATE 530.

Annual, erect or prostrate, branched, often rooting at the nodes; stem and branches strigose with appressed white hairs. Leaves sessile, 2.5-7.5 cm. long, variable in breadth, usually oblong-lanceolate, subentire, acute or subacute, sparsely strigose with appressed hairs on both sides, base tapering. Heads 6-8 mm. diam., solitary or 2 together on unequal axillary peduncles. Involucral bracts about 8, ovate, obtuse or acute, herbaceous, strigose with appressed white hairs. Ray-flowers ligulate, the ligule small, spreading, scarcely as long as the bracts, not toothed, white. Disk-flowers tubular, the corollas often 4-toothed. Pappus 0, except occasionally very minute teeth on the top of the achene. Achenes cuneate, compressed and with a narrow wing, covered with warty excrescences.

Distribution: Bengal, Burma, Malay Peninsula, Central India, Punjab, W. Rajputana, Peninsular India, Ceylon.—Malaya, Cosmopolitan in warm climates.

The plant has a bitter hot sharp dry taste; fattening, alterative, anthelmintic, alexipharmic; good for the complexion, the hair, the eyes, the teeth; cures inflammations, hernias, eye diseases, "kapha" and "vata", bronchitis, asthma, leucoderma, anæmia, diseases of the heart and the skin, itching, night-blindness, syphilis; used to prevent abortion and miscarriage, and for uterine pains after delivery (Ayurveda).

The plant has a bitter sharp taste; improves the colour of the hair and the lustre of the eye; tonic, expectorant, antipyretic, stomachic; good for diseases of the spleen, stomatitis, toothache, headache, hemicrania, fevers, internal diseases, pain in the liver; cures vertigo (Yunani).

It is principally used as a tonic and deobstruent in hepatic and splenic enlargements, and in various chronic skin diseases. There is a popular opinion that the herb taken internally and applied externally will turn the hair black.

The fresh juice of the leaves is rubbed on the shaven scalp for the purpose of promoting the growth of hair.

In Bombay, the natives use the juice in combination with aromatics, as a tonic and deobstruent, and give two drops of it with eight drops of honey to new-born children, suffering from catarrh. In the Gujarat district of the Punjab, it is used externally for ulcers, and as an antiseptic for wounds in cattle.

The fresh plant is applied with sesamum oil in elephantiasis, and the expressed juice in affections of the liver and dropsy. When used in large doses, it acts as an emetic. It is also considered cooling. It is anodyne and absorbent, and relieves headache when applied with a little oil.

The juice of the leaves is given in one teaspoonful doses in jaundice and fevers. The root is given to relieve the scalding of urine.

In Chota Nagpur, the root is applied in conjunctivitis and galled necks in cattle (Campbell).

The leaves are reputed to cure sores when applied to them. The roots merely tied to the belly cure all kinds of ills in it (Carter).

The plant is considered as an astringent in China, and is used for checking hæmorrhages and fluxes and strengthening the gums. The plant is rubbed on the gums for toothache, acting as a counterirritant.

In La Reunion, the plant is considered as pectoral and anti-asthmatic. The decoction is prescribed externally for skin diseases and elephantiasis.

The plant is much used as a cure for asthma and bronchitis in Indo China. The pounded leaves are prescribed in hæmorrhage. In Ceylon, it is used to purify the blood.

In the Gold Coast, the leaves are ground and mixed with cold water. This mixture is then drunk to cure constipation.

There are two varieties of the plant—the yellow flowered and the white flowered—the former variety has thicker leaves which are extensively used in catarrhal jaundice. The fresh leaves are well washed, ground with a few pepper corns, and a lump of the size of a lime is administered early in the morning in sour curd or butter-milk. I have found this drug very useful in curing the disease when so administered for five or six days. Occasionally a purgative may be required to aid the action of the drug. In its action, it resembles podophyllin and taraxacum. It may be administered in the form of a succus (Koman).

In scorpion-sting the leaves are rubbed on the part affected as well as inhaled (Yogaratnakara). In practice the leaves are first rubbed from above the inflamed part down to the sting; they are then made into a paste and applied as a poultice. The treatment is useless (Caius and Mhaskar).

Arabic: Kadimelbint—; *Ashanti:* Ntum—; *Bengal:* Keshori, Kesuti, Keysuria—; *Canarese:* Garagadasappu, Kadiggagaraga—; *Ceylon:* Karippan—; *Chinese:* Han Lien Ts'ao, Li Ch'ang, Me Teou Ts'ao, Pa Ko Ts'ao—; *Gujerati:* Bhangra, Dodhak, Kalobhangro, Kaluganthi—; *Hindi:* Babri, Bhangra, Mochkand—; *Ilocano:* Tintatinta—; *Indo China:* Co muc, Lien tao, Nho noi, Phong trang, Phong truong—; *Malay:* Kurumak jantan, Rumput beu—; *Malaya:* Han lien tsao, Hon lin choi—; *Marathi:* Bangra, Bhringuraja, Maka—; *Mundari:* Benggaraj, Benggraj, Bhenggaraj, Bhenggraj, Huringsarsiranu, Sarsingranu—; *Sadani:* Bengaria—; *Sanskrit:* Ajagara, Angaraka, Bhekaraja, Bhringa, Bhringaraja, Bhringasodara, Bhringavha, Ekaraja, Karanjaka, Kesharaja, Kesharanjana, Keshya, Kuntalavardhana, Mahabhringa, Mahanila, Markara, Markava, Nagamara, Nilabhringaraja, Nilapushpa, Pankajata, Pararu, Patanga, Pitripriya, Rangaka, Shyamala, Sunilaka—; *Santal:* Lalkesari—; *Sind:* Tik—; *Sinhalese:* Kikirindi—; *Tagalog:* Higuismanoc—; *Tamil:* Kaikeshi, Kaivishiilai, Karishalanganni—; *Telugu:* Galagara, Guntagalijeru, Guntakalaagara—; *Urdu:* Bhangra—; *Uriya:* Kesarda—.

WEDELIA Jacq.

Herbs or undershrubs, scabrid-pubescent or hirsute. Leaves opposite, usually toothed. Heads axillary or terminal, heterogamous, rayed, yellow; ray-flowers female, fertile; disk-flowers hermaphrodite, fertile or the inner sterile. Involucre ovoid, campanulate, or subhemispheric; bracts sub-2-seriate, the exterior 3-5, usually herbaceous or foliaceous, the inner dry or rigidly membranous. Receptacle flat or convex, furnished with folded or concave paleæ embracing the hermaphrodite flowers. Corollas of female flowers ligulate, the ligules spreading, entire or 2-3-toothed; corollas of hermaphrodite flowers regular, tubular, with an elongate 5-toothed limb. Anther-bases entire or sagittate, with small blunt auricles. Style-arms of hermaphrodite flowers short or elongate, with subacute hairy tips. Pappus 0 or a toothed cup or ring, or of short scales. Achenes cuneate-oblong or obovoid, thick, laterally compressed or the outer triquetrous, tip rounded, margins obtuse or thickened.—Species 65.—Tropical and warm temperate regions.

1. Leaves subsessile, linear-oblong or oblanceolate, acute or obtuse, entire or subcrenate .... 1. *W. calendulacea.*
2. Leaves petioled, ovate-acuminate, serrate .... 2. *W. wallichii.*

W. calendulacea Less. is used medicinally in Indo China.

1. **Wedelia calendulacea** Less. Syn. Comp. (1832) 222; Wight Ic. t. 1107.—PLATE 531.

A perennial herb 0.3-0.9 m. high; stem procumbent at the base and rooting at the lower nodes, terete, more or less appressedly hairy. Leaves opposite, subsessile, 2.5-7.5 by 1-2.8 cm., lanceolate-oblong, entire or irregularly crenate-serrate, scabrous with short white hairs or at length more or less glabrate, base tapering. Heads 2-3.2 cm. diam., solitary; peduncles 2.5-15 cm. long, erect, slender, slightly thickened beneath the heads. Involucral bracts herbaceous, oblong or slightly obovate, hairy, subobtuse, much longer than the disk-flowers. Ray-flower ligulate, ligules yellow, 2-3-toothed. Style-arms of female flowers long, acute, recurved. Pappus a toothed membranous cup. Achenes of the ray tapering, slightly pubescent.

Distribution: Bengal, Assam, Burma, Konkan, plains districts of Madras Presidency, Ceylon.—Malay Archipelago, China, Japan.

The properties are the same as those of *Eclipta alba* (Ayurveda).

In decoction the plant is used as a deobstruent, and is given in uterine hœmorrhage and menorrhagia.

The leaves are considered tonic, alterative, and useful in cough, cephalalgia, skin diseases and alopecia.

An infusion of the plant is given in Indo China for the swelling of the abdomen. In Annam, the plant is used to prevent the effects of bad waters in the hill tracts.

Bengal: Bangra, Bhimraj, Kesaraja, Kesraj, Kesuria—; *Bombay:* Pivalabhangra—; *Chinese:* Pang K'i Kiou—; *Deccan:* Pilabungra—; *Gujerati:* Bhangaro, Pilobhangro—; *Hindi:* Bhangra, Bhanra—; *Indo China:* Hoa muc, Ngo nui, Tan sa—; *Marathi:* Pivalamaka—; *Sanskrit:* Bhringaraja, Devapriya, Haripriya, Harivesa, Kesaraja, Pavana, Pitabhringaraja, Pitabhringi, Svarnabhringara, Vandaniya—; *Sinhalese:* Ranvankikirindi—; *Tagalog:* Hagonay—; *Tamil:* Patalaikaiantagerai—.

2. **Wedelia wallichii** Less. in Linnæa VI, 162.

Suberect, hispid or scabrid. Leaves petioled ovate acuminate serrate 3-nerved sometimes softly pubescent beneath, outer involucral bracts oblong obtuse or acute equalling or exceeding the disk-flower. Achenes obovoid compressed or obtusely 3-angled, tip contracted.

Distribution: Tropical Himalaya up to 5,000 ft. from Kumaon to Bhutan and the Mishmi Hills, Khasia Mts., Burma.—Java.

The plant is said to heal wounds when applied to them (Carter).

Spilanthes Linn.

Annual herbs. Leaves opposite, usually toothed. Heads usually on long peduncles, axillary or terminal, heterogamous and rayed or homogamous and disciform; ray-flowers female, fertile, 1-seriate; disk-flowers hermaphrodite, fertile. Involucre short, ovoid or campanulate; bracts sub-2-seriate, slightly unequal. Receptacle convex, elongate; paleæ folded, enclosing the hermaphrodite flowers, often contracted with the ovary into a stalk. Corollas of female flowers

ligulate, ligules small, white or yellow, spreading, entire or 2-3-toothed; corollas of hermaphrodite flowers regular, tubular, the limb enlarged or narrowly campanulate, 4-5-fid. Anther-bases truncate, entire or rarely minutely 2-toothed. Style-arms or hermaphrodite flowers rather long, truncate. Pappus 0 or of 2-3 bristles. Achenes of the ray 3-quetrous or dorsally compressed, those of the disk laterally compressed, usually ciliate at the margins or angles.—Species 35.—Tropics.

S. *acmella* Linn. is used medicinally in Indo China, the Philippine Islands, La Reunion, Madagascar, and the Gold Coast; *S. oleracea* Jacq. in Madagascar, Guiana, and Brazil; *S. radicans* Schrad. in Brazil.

OFFICIAL:—The flowers of *S. oleracea* Jacq. (*Pyrethrum Spilanthus* Medik.) and *S. radicans* Schrader (*Cotula piper* Velloso) in Portugal.

1. **Spilanthes acmella** Murr. Syst. Veg. ed. 13 (1774) 610. —PLATE 532.

Annual, erect or ascending; stem and branches more or less hairy. Leaves opposite, 2.5-5 by 1.3-3.8 cm., ovate, acute or subobtuse, irregularly crenate-serrate or sometimes entire, glabrous or nearly so, base usually acute; petioles 0.6-1.6 cm. long, pubescent. Heads 0.6-1.3 cm. long, ovoid, solitary or subpanicled; peduncles sometimes reaching or even exceeding 10 cm. long. Involucral bracts oblong-lanceolate, subacute, pubescent, less than half as long as the head of flowers. Ray-flowers and ligules very often absent, the latter when present minute. Pappus 0. Achenes oblong or slightly obovoid, truncate, much compressed, nearly glabrous.

Distribution: Throughout India, Ceylon.—All warm countries.

The flower-heads are by far the most pungent part. They are chewed to relieve toothache, which they do by producing redness of the gums and salivation.

In Assam, the plant is sometimes administered to women after childbirth (Carter).

Among the Mundas of Chota Nagpur the crushed plant is used as a fish poison. When in the rainy season, the children playing about in the water get their feet and legs covered with rash, they rub them with the leaves of this plant to soothe the itching. Poor people chew its seeds instead of pepper to provoke salivation when their mouth is dry.

In Indo China, the plant is boiled in water and the whole, liquid and solid, given in dysentery. In Ceylon, the leaves and flowers are used for toothache and sore throat; they are also given to women at childbirth.

In the Philippine Islands, a decoction of the root is given as a purgative. A decoction of the leaves is used as a bath in rheumatism, or as a lotion in scabies and psoriasis; the juice is considered vulnerary, as also the pounded leaves made into a poultice. Internally the decoction of the leaves is given as a diuretic and lithotriptic.

In Madagascar, it is used as an antiscorbutic, diuretic, sialagogue, odontalgic, tonic and digestive.

Dr. W. Farquhar has used and recommended a tincture of the flower-heads for toothache, in place of tincture of pyrethrum. He says it is a specific for inflammation of the periosteum of the jaws. A bit of lint, dipped in the tincture and laid on the gums, repeated three or four times a day, has a speedy effect in reducing the pain and swelling.

Ashanti: Nyamengen—; *Assam:* Pirazha—; *Betsileo:* Kimotodoha—; *Betsimisaraka:* Anamafana—; *Bombay:* Akarkara—; *Brazil:* Agriao do Para, Mastruco, Pimenteira do Para—; *Burma:* Henkala—; *French:* Abéadaire, Abécédaire, Acmelle, Alcmelle, Cresson de l'Ile de France, Cresson des Indes, Herbe de Malacca—; *French Guiana:* Cresson para—; *Hova:* Anamalaho, Anamalahokely, Anamalahombazalao, Anamalahoye—; *Indo China:* Cuc ao, Ngo ao—; *La Reunion:* Acmella—; *Madagascar:* Cresson des Indes, Cresson du Para—; *Malay:* Gutang—; *Mundari:* Barandu, Birbiri, Bocotupuri, Cirbiri, Dudmuritasad, Hatukisari, Marceia—; *Pampangan:* Palunag, Palunai—; *Punjab:* Akarkarha, Pokormul—; *Russia:* Akmella—; *Sakalave:* Anamafana—; *Sinhalese:* Akmalla—;

Tagalog: Hagonog, Hagonoi—; *Telugu:* Maratimogga, Maratitige—; *Visayan:* Agonoi—.

2. **Spilanthes acmella** var. **oleracea** C. B. Clarke Comp. Ind. 138.—*S. oleracea* Jacq. Hort. Vind. II, t. 135.—PLATE 533A (under *S. oleracea* Jacq.).

More robust and succulent than the type, heads and leaves larger, peduncles subsolitary, achenes margined, scabrid.

Distribution: Cultivated in gardens.

The whole plant is very acrid, but the flower-heads are especially so, having a hot, burning taste, which causes profuse salivation. They are considered a powerful stimulant and sialagogue, and used in headaches, paralysis of the tongue, affections of the throat and gums, and for toothache. A popular remedy for children who stammer.

In Madagascar, it is considered to have the same therapeutic properties as *S. acmella* proper.

Betsileo: Kimotodoha, Mangevitsa—; *Betsimisaraka:* Anamafana—; *Brazil:* Mastruco, Pimenteira do Para—; *Catalan:* Creixans del Para—; *English:* Para Cress—; *French:* Bréde malgache, Cresson du Bresil, Cresson du Para—; *French Guiana:* Cresson para—; *German:* Parakresse—; *Hova:* Anamalaho, Anamalahokely, Anamalahombazaho, Anamalahoye—; *Russian:* Brazilskiy Kress, Tsarskiy Kress—; *Sakalave:* Anamafana—; *Spanish:* Berros del Para, Espilanto—.

GUIZOTIA Cass.

Annual herbs. Leaves opposite, or the upper alternate. Heads peduncled, axillary and terminal, heterogamous, rayed; ray-flowers female, 1-seriate, fertile; ligule 2-3-toothed, yellow; disk-flowers hermaphrodite, fertile, limb campanulate 5-fid; tube of both short, woolly, embracing the top of the achene. Involucre campanulate; bracts sub-2-seriate, outer subfoliaceous, inner like the pales; receptacles convex or conic; pales flat, scarious. Anther-bases truncate, entire. Style-arms of hermaphrodite, with subulate hairy tips.

Achenes glabrous, dorsally compressed, tip rounded; pappus 0.—Species 8.—Africa.

The genus is therapeutically inert.

1. **Guizota abyssynica** Cass. in Dict. Sc. Nat. 59, 248.—*Verbesina sativa* Roxb. Fl. Ind. III (1832) 441.—Plate 533B.

A leafy herb forming in cultivation beautiful golden yellow crops. Stem slightly hairy. Leaves opposite sessile and half-amplexicaul, 7.5-12.5 cm., linear oblong or lanceolate, serrate. Heads 1.3-2.5 cm. diam. on peduncles 2.5-5 cm. long. Ovary tipped with a ring of hairs and the hairy base of the corolla.

Distribution: A native of tropical Africa. Cultivated in various parts of India.

The oil from the seeds is employed as a substitute for ghee and sesamum oil.

Chemical data are available. The latest being due to Kale (18th Ind. Sc. Congress; Nagpur, 1931).

Bengal: Ramtil, Sirguja—; *Bombay:* Kerani, Ramatila—; *Canarese:* Huchchellu, Ramtil—; *English:* Niger Oil Plant, Niger Seed Plant—; *Gujerati:* Kalatel—; *Hindi:* Kalatil, Surguja—; *Kolami:* Kallatil, Til—; *Marathi:* Kalitil—; *Portuguese:* Verbesina da India—; *Santal:* Surguja—; *Telugu:* Valesulu, Vulisi—.

Helianthus Linn.

Herbs, often very large, with opposite or alternate coarse leaves and medium to very large radiate heads, solitary or in loose corymbs. Involucre hemispherical or very broad, bracts 2-many-seriate, outer at times with foliaceous tips. Ray-flowers neuter (and occasionally in cultivation all the disc-flowers become ligulate). Cypsele thick, slightly compressed or 4-angled. Pappus of 2 deciduous awns sometimes with a caducous bristle between them, or of 2 large dry scales.—Species 60.—America.

The genus is therapeutically inert.

The oil from the seeds of *H. annuus* Linn. are officinal in Russia.

1. **Helianthus annuus** Linn. Sp. Pl. (1753) 904.

An annual plant, markedly pubescent. Stems hispid or hirsute, 1-2 m. high or higher in cultivation, branched above. Leaves mainly alternate; blades broadly ovate, 7-30 cm. long, or smaller above, usually slightly acuminate at the apex, decidedly toothed, those of the lower leaves cordate at the base, those of the upper cuneate. Ligules of the ray-flowers 2.5-5 cm. long; disk flat, 3-5 cm. broad. All parts are often much larger in cultivated forms.

Distribution: America.—Cultivated in India.

The flower is pungent and hot; anthelmintic; antiperiodic, cures "kapha", skin diseases, itching, ulcers, leprosy, hysteria, fever with rigor, biliousness, "vata", asthma, bronchitis, urinary discharges, anæmia; good for burning sensation in the vagina, worms in the cars, scorpion-sting (Ayurveda).

A decoction of the root strengthens the teeth and cures toothache.—The leaves are emetic; applied in lumbar pain.—The flowers have a bitter bad taste; tonic, emmenagogue, aphrodisiac; lessen inflammation; given in insanity; applied in complaints of the chest, liver, lungs; used in piles, ophthalmia, ascites; cure diseases of the kidney (Yunani).

The seeds are diuretic and expectorant. This drug has successfully been used in bronchial, laryngeal, and pulmonary affections, coughs and colds.

The sunflower is prescribed in snake-bite (Vagbhata, Rasaratnakara) and scorpion-sting (Rasaratnakara, Vaidyavinoda). In the latter case the juice of the flower is warmed and poured into the nostrils (Arkaprakasha, Bhavaprakasha).

The sunflower is useless in the treatment of both snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Arabic: Arzivana—; *Bengal:* Shuriamukti, Surjamuki—; *Bombay:* Surajmaki, Suryakanta—; *Catalan:* Girasol, Mirasol—; *Deccan:* Surijkajhar—; *Dutch:* Zonnebloem—; *English:* Lady Eleven o'Clock, Marigold of Peru, Sunflower—; *French:* Anthilion, Couronne de soleil, Girasol, Grand soleil, Grand soleil des jardins, Hélianthe,

Soleil cultivé, Soleil rigide, Tournesol—; *German:* Sonnenblume—; *Greek:* Hiliotropion—; *Gujerati:* Surajamukhi—; *Hindi:* Hurhuja, Surajmukhi—; *Italian:* Clytia, Girasole, Harpalio—; *Konkani:* Jirasol, Suriakamal—; *Madras:* Suriyakandi—; *Marathi:* Brahmoka, Surajmaka, Suryaphula—; *Persian:* Aftabi, Guleaftabeparasta, Guliaftab—; *Portuguese:* Girasol, Heliotropio—; *Roumanian:* Floarea soarelui, Ruja soarelui—; *Russian:* Padsolnechnik—; *Sanskrit:* Adityabhakta, Suryamukhi, Suryavarta, Suvarchala—; *Spanish:* Girasol, Mirasol—; *Telugu:* Adityabhaktichettu, Poddatringuddachettu, Poddutiruguduchettu—; *Urdu:* Surajamakkhi—.

Glossocardia Cass.

An annual diffuse branched glabrous herb. Leaves alternate, slender, 1-2-pinnatisect. Heads small, terminal or axillary, often numerous, pedunculate, heterogamous, rayed, yellow; ray-flowers female, usually solitary, fertile; disk-flowers hermaphrodite, few. fertile, tubular. Involucre oblong; bracts few; the exterior 1-3, small; the inner 3-5, with membraneous margins. Receptacle flat, with a few flat paleæ interspersed among the flowers. Corollas of female flowers ligulate, the ligules 2-fid; corollas of hermaphrodite flowers regular, tubular, with a slightly enlarged or narrowly campanulate 4-fid limb. Anther-bases obtuse, entire. Style-arms of hermaphrodite flowers with short linear acute hispid tips. Pappus of 2 small stiff awns. Achenes narrowly oblong, dorsally much compressed, ciliate and with bearded faces.—Species 1.—Indo-Malayan.

1. **Glossocardia bosvallia** DC. Prodr. V, 631; Wight Ic. t. 1,110.—*G. linearifolia* Cass. in Dict. Sc. Nat. XIX (1821) 62.—Plate 534 (under *G. linearifolia* Cass.).

A small prostrate or erect annual, much-branched from the base; stems and branches deeply grooved. Leaves 1.3-5 cm. long, 2-pinnatisect; segments linear, apiculate; petioles variable in length, slender. Heads 1 cm. long; paleæ of receptacle linear, acute, flat. Outer involucral bracts usually 3, ovate-lanceolate, acute, about 3 mm. long with membranous and slightly ciliate margins and a green midrib; inner involucral bracts 6-8 mm. long, oblong, subobtuse,

striate, glabrous and with pale membranous margins. Pappus of 2 stiff slightly divaricate awns. Achenes 6 mm. long, brown, narrowly oblong, much flattened, densely hairy on the edges and somewhat less densely so on the flat faces.

Distribution: Upper Gangetic Plain, Central India, Konkan, Deccan, S. M. Country, N. Kanara, all plains districts of Madras Presidency.

The plant is much used in female complaints.

Bombay: Phatursuwa, Pithapra—; *Hindi:* Seri—; *Marathi:* Patharasuva—; *Poona:* Pittapapada—; *Sanskrit:* Pithari—; *Telugu:* Parapalanamu—.

BIDENS Linn.

Annual or perennial, sometimes climbing herbs. Leaves opposite, entire toothed gashed or 1-2-pinnate. Heads corymbosely panicled or subsolitary, heterogamous and rayed or homogamous and disciform; ray-flowers, if present, female or neuter, 1-seriate, ligule spreading yellow or white; disk-flowers hermaphrodite, fertile, tubular, limb cylindric 5-fid. Involucre campanulate or hemispheric; bracts sub-2-seriate, bases connate, outer herbaceous short or leafy, inner membranous; receptacle flat or convex, pales narrow nearly flat, Anther-cells entire or sub-sagittate. Style-arms of hermaphrodite hairy above, tips short acute or long and subulate. Achenes 4-gonous or dorsally compressed, linear or cuneiform, often narrowed but not beaked above; pappus of 2-4 rigid, retrosely hispid bristles or 0.— Species 150.— Cosmopolitan.

1. Achenes cuneiform, tip truncate .... 1. *B. tripartita.*
2. Achenes long, slender, narrowed from the middle to the top .. 2. *B. pilosa.*

The genus exhibits emollient and antiscorbutic properties.

B. pilosa Linn. is used medicinally in China, Indo China, Brazil, Gold Coast, Kenya, Tanganyika and South Africa; *B. tripartita* Linn. also is used in China, and *B. graveolens* Mart. in Brazil.

1. **Bidens tripartita** Linn. Sp. Pl. (1753) 831.

Stout, annual, erect, 30-90 cm. high, glabrous. Leaves 7.5-12.5 cm., 3-lobed, 3-partite or pinnatifid, segments lanceolate, toothed,

heads erect, solitary, discoid, 17 mm. diam.; outer involucral bracts herbaceous, exceeding the inner; inner oblong with scarious margins; peduncles long or short. Achenes 6 mm., glabrous, with 2-3 short awns.

Distribution: Central and W. Himalaya, W. Tibet, N. Asia, Japan, Westwards to N. Africa, W. Europe and N. America.

The Chinese use the plant in chronic dysentery and in eczema.

Chinese: Lang Pa Ts'ao—; *English:* Bur Marigold Double-tooth, Three-cleft Bur-marigold, Three-lobed Butterbur, Water Agrimony—.

2. **Bidens pilosa** Linn. Sp. Pl. (1753) 832.

Annual, erect, glabrous or more or less pubescent, 60-90 cm. high; stems quadrangular, grooved; branches opposite. Leaves very variable, sometimes 3-foliolate, but usually consisting of 2 sub-opposite pairs of leaflets and a deeply 3-lobed terminal leaflet which is larger than the lateral ones, the lowest pair of leaflets sometimes again pinnately divided; ultimate leaflets subsessile, ovate, acute, serrate, glabrous; common petioles somewhat dilated and sheathing at the base. Heads reaching 1.3 cm. diam., elongating in fruit. Outer involucral bracts herbaceous, oblong, subacute, shorter than the inner, ciliate and with scarious margins. Ray-flowers ligulate, white or yellow, ligules narrow, strap-shaped. Pappus of 2-4 rigid retrorsely hispid slightly spreading awns. Achenes 8-17 mm. long, linear, quadrangular, slightly tapering towards the apex, glabrous.

Distribution: Throughout India, Ceylon and most warm countries.

In Indo China, the dried flower buds ground and mixed with alcohol are used as a mouth wash in toothache. For sore eyes the pounded leaves are applied over the eyelids.

The leaves are used in Brazil as a styptic in stopping the flow of blood, and as a vulnerary. They are applied to foul ulcers and swollen glands.

In the Gold Coast, the juice of the leaves is commonly squeezed into the eyes or the ears to cure eye complaints or ear complaints. In the latter case the leaves are first warmed in water with pepper.

The Zulus chew the young shoots for the treatment of rheumatism. They also administer the powdered leaf in water as an enema for abdominal troubles and rub the burnt seeds into incisions on the sides for the relief of pain. The flower is a remedy for diarrhœa, and an infusion of the leaf and root a remedy for colic.

Afrikaans: Duivelskerwel, Wevenaar—; *Chinese:* Kuei Chen Ts'ao—; *Gold Coast:* Black Jack—; *Gujerati:* Phutium, Samarakokadi—; *Iloilo:* Tubactubac—; *Indo China:* Cuc ao, Quay cham thao, Tu to hoan—; *Kikuyu:* Michegi—; *Krepi:* Adzrorkpii—; *Krobo:* Dsetshi—; *Malay:* Rumpat juala—; *Meru:* Rathangi—; *Nandi:* Kipkoleit—; *Sinhalese:* Waltekola—; *South Africa:* Beggarsticks, Black Jack—; *Suto:* Moonyane—; *Twi:* Gyinantwi—; *Zulu:* uQadolo—.

GLOSSOGYNE Cass.

Perennial glabrous herbs with almost naked stems and branches. Leaves mostly radical, crowded, pinnatifid, or cuneate and 3-toothed, the cauline leaves alternate, or the lower opposite or 0. Heads small, peduncled, few, corymbose, heterogamous and rayed or homogamous and disciform; ray-flowers female, fertile; disk-flowers hermaphrodite, fertile. Involucre small; bracts 2-3-seriate, narrow, shortly connate at the base; the inner often larger and margined. Receptacle flat; paleæ scarious, flat or concave. Corollas of female flowers ligulate, yellow (or white?), the ligules spreading, entire or coarsely 2-3-toothed; corollas of hermaphrodite flowers yellow. Anther-bases obtuse. Style-arms of hermaphrodite flowers with long hairy appendages. Pappus of 2 retrorsely scabrid bristles. Achenes dorsally compressed, linear or ovoid, sometimes almost winged, truncate at the apex, glabrous.—Species 5.—Indo-Malaya, China.

The genus is therapeutically inert.

1. **Glossogyne pinnatifida** DC. in Wight Contrib. (1834) 19.—PLATE 535A.

Perennial, with a woody fusiform root; stems numerous from the root; branches chiefly from near the top, slender, forked. Leaves chiefly radical, erect, coriaceous, 2.5-5 cm. long (including the

petiole), pinnatifid; segments few, linear-oblong, subacute, entire, glabrous. Flowering branches 15-30 cm. long, almost leafless, grooved, glabrous. Heads 6-8 mm. diam., elongating in fruit. Involucral bracts connate at the base, linear-oblong, obtuse. Ray-flowers ligulate, yellow, ligules 3-toothed. Pappus of 2 retrorsely scabrid spreading awns. Achenes 6-8 mm. long, linear-oblong, grooved, glabrous, dark brown.

Distribution: Punjab Plain, Upper Gangetic Plain, Kumaon, Chota Nagpur, W. Bengal, S. M. Country, N. Circars, Deccan of Madras Presidency.

A preparation from the root is employed by the Santals as an application to snake-bite, and scorpion-sting (Campbell).

The root is useless in the antidotal and symptomatic treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Gujerati: Pardesibhangro—; *Santal:* Barangom bir barangom—.

ACHILLEA Linn.

Perennial pubescent or villous herbs. Leaves alternate, narrow, serrulate or pinnatisect. Heads small, corymbose, heterogamous and rayed or homogamous and disciform; ray-flowers few, female, rarely neuter, ligule short white pink or yellow; disk-flowers hermaphrodite, fertile, tube terete or compressed and 2-winged, base often produced over the top of the achene, limb 5-fid. Involucral bracts in few series, appressed, margins often scarious and black, outer shorter; receptacle flat or elevated, pales membranous. Anther-bases obtuse. Style-arms of hermaphrodite with truncate and penicillate tips. Achenes oblong or obovoid, dorsally compressed, glabrous, with 2 cartilaginous wings; pappus 0.—Species 115.—N. temperate.

1. Ray white, pink or purple .... 1. *A. millefolium.*
2. Rays yellow .... 2. *A. santolina.*

A mild aromatic sudorific, tonic, astringent and vulnerary.

The following species are used medicinally in Europe—*A. ageratum* Linn., *A. atrata* Linn., *A. millefolium* Linn., *A. moschata* Jacq., *A. nana* Linn., *A. nobilis* Linn., *A. ptarmica* Linn.—; in China

and Indo China—*A. sibirica* Ledeb.—; in North America—*A. millefolium* Linn.—.

A. millefolium and *A. moschata* yield achilleine, and alkaloid of unknown composition. The latter also contains an ill-defined glucoalkaloid, moschatine.

OFFICIAL:—The leaves of *A. millefolium* Linn. in Portugal, Russia, Sweden, Switzerland; the herb in Austria.

1. **Achillea millefolium** Linn. Sp. Pl. (1753) 899.—PLATE 536A.

An erect, pubescent herb; stems 15-60 cm., leafy, grooved. Leaves alternate, oblong-lanceolate, 5-10 by 0.6-2 cm., 3-pinnatisect; segments linear, acute; radical leaves stalked, upper sessile. Heads radiate, 6 mm. diam., crowded in compound corymbs. Involucral bracts few, erect, outer ones shorter; receptacle flat, covered with thin, oblong scales nearly as long as the flowers; flowers white or pale pink; pappus none; ligules rounded, reflexed; corolla of disk-flowers 5-lobed. Achenes oblong, flattened, shining.

Distribution: W. Himalaya, from Kashmir to Kumaon, 6,000—9,000 ft.—N. Asia, Europe, N. America.

The flower is bitter; laxative, emmenagogue, vulnerary, diuretic, analgesic, anthelmintic, antipyretic, stimulant; tonic to the brain; stimulant tonic to the female organ of generation; used in gleet, urinary discharges, liver complaints, colds in the head, chest complaints, delirium (Yunani).

The herb is diaphoretic, stimulant, tonic. It is most useful in colds, obstructed perspiration, and the commencement of fevers. It opens the pores freely and purifies the blood.

The herb has also proved useful in hysteria, flatulence, heart-burn, colic and epilepsy.

In Norway, it is employed for the cure of rheumatism, and sometimes chewed for toothache.

In Scotland, a warm decoction of the fresh leaves is regarded as a family specific against the colds and other ailments common to childhood.

It is much used in England as a vulnerary, and is given internally for the suppression of hæmorrhages and of profuse mucous discharges. It is employed also in intermittents and as an antispasmodic in flatulent colic and nervous affections. Its hot infusion is used as an emmenagogue in France, and also in the suppression of the lochia; it is sometimes employed in low exanthematous fevers with difficult eruption.

An infusion was used by the Winnebag Indians of North America to bathe swellings. For earache a wad of the leaves, also the infusion was put into the ear (Gilmore).

In California, the leaves steeped in hot water are considered very healing applications to cuts or bruises; and among the Spanish-Californians, the fresh plants are used for stanching the blood in recent wounds.

Afghanistan: Buimaderan—; *Arabic:* Suila—; *Bombay:* Rojmari—; *California:* Milfoli, Old Man, Yarrow—; *Catalan:* Herba de tall, Marfull—; *Cutch:* Biranjasif—; *Danish:* Rœllike—; *Dutch:* Duizenblaad—; *English:* Arrow-root, Bloodwort, Camil, Cammock, Carpenter-grass, Carpenter's Weed, Devil's Nettle, Devil's Plaything, Dog Daisy, Eerie, Garwe, Green, Bad Man's Plaything, Arrow, Hundred-leaved Grass, Melefowe, Milfoil, Nosebleed, Old Man's Mustard, Old Man's Pepper, Sanguinary, Sneezewort, Soldiers' Woundwort, Stanch Girs, Staunch Grass, Stench Girs, Thousand-leaved Clover, Tansy, Wild Pepper, Thousand Leaf, Yarrow, Yarroway—; *French:* Achilléine, Herbe aux charpentiers, Herbe aux coupures, Herbe militaire, Herbe ă saigner, Herbe de saint Jean, Herbe aux voituriers, Millefeuille, Saignenez, Sourcil de Vénus—; *German:* Achilleskraut, Angerblume, Anserine, Bauchwehkraut, Edelgarbe, Fasankraut, Feldgarbe, Gachel, Gacht, Gænsezungen, Gærb, Garwekraut, Gerbel, Gollenkraut, Gor, Gotteshand, Grillen, Grinsing, Gruensing, Gruettblume, Gruetzenkraut, Grundheil, Hasegerf, Hasengarbem Heftkraut, Heidekraut, Jase, Judenkraut, Jungfraukraut, Kachelblume, Karweblume, Katzenfittich, Katzenschwanz Kelkenkraut, Kerpen, Krænzel, Krebselkraut, Lœwenfusskaut, Margaretenkraut, Marienkranz, Reels, Reelse, Relaka,

Releke, Relik, Relkike, Rœhlke, Rœlken, Rœllicke, Rœlskraut, Rohlech, Ruels, Sægkraut, Schabab, Schabor, Schafgarbe, Schaffripchen, Schafrippe, Schafzunge, Schapschar, Schober, Sichelblume, Sichelschnitt, Siebengartenkraut, Tausendblatt, Weisses Garbenkraut, Zeiskraut, Zimmermannskraut—; *Greek:* Myriophyllon—; *Hindi:* Gandana—; *Hungarian:* Ezer-levelu-fu—; *Irish:* Athair thalmhna—; *Italian:* Millefoglie, Millefoglio—; *Kashmir:* Momadruchopandiga—; *Malta:* Common Milfoil, Yarrow, Haxixa tal morliti—; *Persian:* Buimaderan—; *Polish:* Tysiacznik ziele—; *Portuguese:* Mil em rama, Milfolha, Milfolhada—; *Roumanian:* Coada soarecelului—; *Russian:* Tesyachelistnik—; *Spanish:* Milefolio, Milenrama, Yerba de San Juan—; *Swedish:* Rœlleke, Roflleka—; *Urdu:* Biranjasifa—.

2. **Achillea santolina** Linn. Sp. Pl. (1753) 896.

A perennial plant, 20-60 cm. high, or sometimes somewhat more, stems terete, simple or branching below, canescent. Leaves pubescent; segments of the lower leaves and those of young shoots somewhat distant. Corymbs compound; peduncles shorter or a little longer than the 5 mm. long heads; scales of the involucre oblong, obtuse; rays yellow, very short.

Distribution: Baluchistan.—Afghanistan, Persia, Mediterranean.

In Chaman, it is given to children to cure stomachache (Hughes-Buller).

Mach: Bœmadran—; *Pushtu:* Zawal—.

ANTHEMIS Mich. ex Linn.

Annual or perennial herbs. Leaves alternate, deeply toothed or pinnatisect. Heads terminal, peduncled, rarely corymbose, heterogamous and radiate (very rarely disciform), ray-flowers female, fertile sterile or neuter, 1-seriate, tube terete or 2-winged, ligule spreading; disk-flowers hermaphrodite, fertile tube compressed or 2-winged, base usually 1-2-gibbous, limb 5-fid. Involucre hemispheric; bracts many-seriate, appressed, rigid, margins scarious, outer shorter; receptacle convex or elongate; pales broad or narrow, rigid or hyaline, sometimes embracing the flowers. Anther-bases obtuse.

Style-arms of hermaphrodite with truncate penicillate tips. Achenes oblong, glabrous, 4-5-angled, 8-10-ribbed or many-striate, truncate; pappus 0 or very short, paleaceous or of a membranous large or small auricle.—Species 120.—Europe, Mediterranean.

The genus exhibits tonic, antispadmodic, stomachic, emmenagogue, and emetic properties.

A. nobilis Linn. is much used medicinally in Europe.

OFFICIAL:—The flowers of *A. nobilis* Linn. (Austria, Belgium, France, Holland, Italy, Spain, Switzerland)=*A. aurea* Brot. (Portugal).

The root of *A. Pyrethrum* Linn. (*Anacyclus Pyrethrum* De Cand) in Portugal,—DC. in Austria.

1. **Anthemis gayana** Boiss. Fl. Or. III, 313.

A small tomentose canescent herb; stems filiform, erect, very short, scapiform, or sparingly branched below. Leaves small, petiolate, in outline ovate or oblong, pinnately or subbipinnately divided. Peduncles elongate, finally slightly thickened. Heads small. Outer leaves of the involucre lanceolate, somewhat acute, inner ones oblong, scarious at the apex. Receptacle ovate, pales lanceolate carinate, acuminate, shorter than the disk. Ligules white ovate, slightly shorter than the disk, hairy at the base. Tube of disk-flowers short, often hairy, thickened at the base. Achenes smooth, sulcate, slightly narrowed at the base, angular, truncate at the apex; margin acute, narrow.

Distribution: Baluchistan.—Persia.

In the Harboi Hills, the leaves are eaten to cure pains in the chest (Hughes-Buller).

Harboi Hills: Piunphuli—.

CHRYSANTHEMUM Linn.

Perennial or annual herbs, rarely shrubs. Leaves alternate, entire toothed lobed or pinnatifid. Heads large, terminal, long-peduncled, or smaller and corymbose, heterogamous, rayed (very

rarely disciform); ray-flowers female, 1-seriate, fertile, ligule spreading white, yellow or rosy; disk-flowers hermaphrodite, fertile, tube terete or 2-winged, limb 4-5-fid. Involucre hemispheric or broader; bracts many-seriate, broad, appressed, inner with scarious tips, outer shorter often with scarious coloured margins; receptacle various, naked. Anther-bases obtuse, entire. Style-arms of hermaphrodite with truncate penicillate tips. Achenes subterete or angled, variously ribbed or winged; pappus 0 or short, or a cup or auricle.—Species 180.—Europe, Asia, Africa, America.

1. Perennial .... 1. *C. indicum.*
2. Annual .... 2. *C. coronarium.*

The leaves are depurative. Insect powder is obtained from the flower heads of several species.

The following are used medicinally in Europe—*C. balsamita* Linn., *C. cinerariaefolium* Vis., *C. leucanthemum* Linn., *C. parthenium* Bernh., *C. vulgare* Bernh.—; in Persia—*C. marschallii* Aschers—; in China—*coronarium* Linn., *C. decaisneanum* Max., *C. indicum* Linn., *C. sinense* Sab.—; in Indo China—*C. indicum* Linn., *C. sinense* Sab.—.

1. **Chrysanthemum indicum** Linn. Sp. Pl. (1753) 899.—PLATE 535B.

Perennial. Wild plant shrubby, erect, rigid, few-leaved. Leaves thin, flaccid, pinnately parted, with acute or mucronate teeth. Outer involucral bracts broad, scarious, except the herbaceous mid-nerve. Rays yellow shorter than diam. of the disk.

Distribution: A native of China and Japan.—Grow in Indian gardens.

The flower has a sharp bitter taste; cooling, digestible cardiotonic, astringent to the bowels, stomachic; improves the taste and the complexion; purifies the blood; cures "tridosha"; used in stomatitis, leprosy, biliousness, burning sensation (Ayurveda).

The flower has a sharp bad taste; diuretic, emmenagogue, carminative, vulnerary; used in all sorts of complaints; purifies the blood and the liver; clarifies the brain; lessens inflammation; given in urinary discharges, gleet, lumbago (Yunani).

This plant is considered heating and aperient, useful in affections of brain and calculus, and to remove depression of spirits.

The natives of the Deccan, administer the plant in conjunction with black pepper, in gonorrhœa.

In China, the flower heads are made into tonic and sedative preparations. Infusions are frequently applied as a collyrium in eye affections.

In Indo China, the leaves are used as a depurant; they are prescribed in migraine. The flowers are given for sore eyes and for inflammations of the abdomen. In Malaya, the flowers are used for sore eyes and to promote longevity.

Bombay: Akurkura, Chevati—; *Chinese:* Yeh Chu—; *French:* Pyrĕthre—; *Hindi:* Guldaudi—; *Indo China:* Cuc rieng vang, Gia cuc, Kien cuc an dat, Kim cuc—; *Ladak:* Kalzang—; *Madras:* Sivandi—; *Marathi:* Shevati—; *Punjab:* Bagaur, Gendi—; *Sanskrit:* Bahupatrika, Bhringavallabha, Bringheshta, Charukesara, Gandhadya, Karnika, Kumari, Ramataruni, Saha, Sevanti, Shetapatri, Shivavallabha, Sudala, Taruni—; *Tagalog:* Dolontas—; *Tamil:* Akkarakkaram—; *Telugu:* Chamunti—; *Urdu:* Guledawoodi—.

2. **Chrysanthemum coronarium** Linn. Sp. Pl. (1753) 1254. —Plate 536B.

An annual plant, 0.3-0.8 m. high on sometimes somewhat more, glabrous; stem erect, branching, leafy. Lower leaves tapering at the base, upper half-clasping, all bipinnatisect into acutely toothed. lanceolate lobes, rhachis dentate-lobed. Rays obovate-oblong; achenes grooved, tubercled, those of disk compressed-4-angled, with a narrow wing at the inner side.

Distribution: A native of the Mediterranean region.—Planted in Indian gardens.

The bark is purgative and is used in syphilis.—The leaves are applied topically to lessen inflammation (Yunani).

The flowers are a tolerable substitute for chamomile. The root chewed communicates the same tingling sensation to the tongue as pellitory.

The people of the Deccan administer the plant in conjunction with black pepper in gonorrhœa.

Assam: Pithogarkah—; *Bengal:* Guldaudi—; *Bombay:* Seoti—; *Canarese:* Hale—; *Chinese:* T'ung Hao—; *Deccan:* Gulchini—; *Gujerati:* Guldaudi—; *Hindi:* Akurkurra, Gulchini, Guldaudi—; *Ladak:* Kalzang—; *Malta:* Crown Daisy, Bambagella, Fior d'oro, Lellux, Zigland—; *Marathi:* Gulesevati, Tursiphal—; *Persian:* Guledaudi—; *Punjab:* Bagaur, Zaenil—; *Sanskrit:* Chandramallika, Seunti, Shevantika, Sventi—; *Sinhalese:* Lavulugas—; *Tamil:* Shamantippu—; *Telugu:* Chamanti—; *Urdu:* Gulechini—.

MATRICARIA (Tourn.) Linn.

Annual or perennial herbs. Leaves alternate, 1-2-pinnatisect. Heads terminal, peduncled, solitary or corymbose, heterogamous, rayed (rarely disciform); ray-flowers female, fertile or sterile, ligule white elongate rarely short; disk-flowers hermaphrodite, fertile, tube terete or 2-edged, limb 4-5-fid. Involucre hemispheric, bracts in few series, appressed, margin usually scarious and brown, outer shorter; receptacle naked. Anther-bases obtuse, entire. Style-arms of hermaphrodite with truncate and penicillate tips. Achenes oblong, often incurved, faces glandular or rugulose, truncate, dorsally convex and ribbed or not, ventrally 3-5-ribbed; pappus very short, coroniform, dimidiate or 0.—Species 50.—S. Africa, Europe, Mediterranean, W. Asia.

1. Leaves bipinnatifid .... 1. *M. chamomilla.*
2. Leaves small in outline, narrowly oblong, cuneate, pinnatipartite .... 2. *M. lasiocarpa.*

Carminative, sedative, and tonic.

M. chamomilla Linn. and *M. suaveolens* Pursh. are used medicinally in Europe; *M. glabrata* DC., *M. globifera* Fenzl., *M. multiflora* Fenzl., *M. nigellaefolia* DC. in South Africa.

OFFICIAL:—The flowers of *M. Chamomilla* Linn. (Austria, Denmark, Germany, Holland, Italy, Japan, Norway, Portugal, Spain, Sweden, Switzerland, Turkey)=*Chamomilla vulgaris* K. Koch (Russia)=*Chrysanthemum Chamomilla* Bernh., *Chamomilla officinalis* C. Koch (Hungary); *M. suaveolens* Pursh. (Russia).

1. **Matricaria chamomilla** Linn. Sp. Pl. (1753) 891.—PLATE 537A.

A glabrous much-branched aromatic herb about 30 cm. high. Leaves 2-3-pinnatisect; segments almost filiform. Heads solitary, long-peduncled, 1.3-2 cm. diam. Involucral bracts oblong, margins white. Receptacle conic, elongating during fruiting. Ligules white, much longer than the bracts, deflexed after flowering or 0. Achenes with slender white ribs on the ventral face only. Pappus 0.

Distribution: Punjab and Upper Gangetic Plain.—Westwards to the Atlantic, N. Asia, Japan.

The root is stimulant, tonic, carminative.—The flower has a sharp taste and pleasant smell; tonic to the brain, pectoral; enriches the blood; aphrodisiac, diuretic, diaphoretic, carminative; used in headache, gonorrhœa, ophthalmia, chest pains, scabies; removes urethral and renal gravel.—The oil is aphrodisiac, analgesic; used for all kinds of pains; lessens inflammation; good for cough and troubles of the chest (Yunani).

The flowers are considered stimulant, attenuant and discutient. They are used in constitutional debility, hysteria, dyspepsia and intermittent fevers. The warm and strong infusion of the flowers is emetic, while a weak infusion acts as a tonic and febrifuge. In flatulence and colic, Chamomile oil is the most effectual of all remedies.

In Gujarat, the oil is used externally in rheumatism.

The flowers are considered an excellent remedy in children's ailments in many parts of Europe. They act as a nerve sedative and also as a tonic upon the gastro-intestinal canal. It is a useful remedy during dentition, in cases of earache, neuralgic pains, stomach disorders and infantile convulsions.

Arabic: Babunah, Shajrabelkaffoor, Tuffahelard—; *Catalan:* Camamilla comu, Camamilla de Urgel—; *Danish:* Kamille—; *English:* German Chamomile, Persian Chamomile, Willd Chamomile—; *French:* Amarou, Astartife, Camomèle, Camomille d' Allemagne, Camomille commune, Camomille du Nord, Chamille, Malherbe,

Mandiane—; *German:* Feldkamille, Gelbermaiblume, Hærmelchen, Halmerl, Hameln, Harmel, Haugenblume, Helmerchen, Hermænnle, Hermchen, Hermeln, Herminchen, Hermligen, Hermuentzel, Hermunel, Kamilechte, Kamille, Karnille, Kummerblume, Laugenblume, Magdblume, Maidblume, Matronenkraut, Mutterkamille, Mutterkraut, Raimain, Ramerian, Romeien, Romer, Romerai, Romey, Sækfit, Stomeienblume, Thamillen, Zæuwih—; *Gujerati:* Babuna—; *Italian:* Camomilla comune, Capomilla—; *Malta:* Chamomille, Gowan, Camomilla, Camumilla—; *Naples:* Cambomilla—; *Norway:* Kamille—; *Parma:* Margariteine de pra—; *Pavia:* Crespola—; *Persian:* Babunah—; *Piedmont:* Amoreggiola, Camamia—; *Portuguese:* Camomilla dos Allemæs—; *Potenza:* Cambomilla—; *Punjab:* Babuna, Suteigul—; *Reggio:* Camamella—; *Romagna:* Camomella, Matricaria, Matricheria—; *Roumanian:* Musatel, Romanita—; *Russian:* Romashka aptetchnaya—; *Sardinia:* Carbomiglia, Capomilla, Crabumiglia—; *Sicily:* Calumidda—; *Spanish:* Manzanilla comun, Manzanilla de Urgel—; *Swedish:* Kamomill—; *Tuscany:* Camomila, Camumilla, Capomilla, Caprimilla, Capumilla—; *Urdu:* Babunah—; *Verona:* Erba Maria, Margarite, Samariza—.

2. **Matricaria lasiocarpa** Boiss. Fl. Or. III, 324.

An annual herb, very sparingly and shortly puberulous, glabrescent, many-stemmed, stems ascending, sparingly branched at the base passing into filiform peduncles. Leaves small in outline narrowly oblong-cuneate, narrowed into the petiole, pinnatipartite, forming 2-3 shortly linear, obtuse laciniæ. Heads small. Leaves of hairy involucre oblong, rather broadly scarious-lacerated. Receptacle ovate-conical. Ligules white or rose, obovate, shorter than the disk. Achenes minute, obconical, slightly hispid, below 5-ribbed; corona half as long as the ribs, lobed, very much fimbriate ciliate.

Distribution: Baluchistan.

At Nushki in Baluchistan, a decoction of the flowers is used to cure fever (Hughes-Buller).

Dak: Piunpulli—; *Nushki:* Painphuli—.

TAGETES Linn.

Herbs, often gland-punctate, with opposite pinnatisect, rarely subentire, serrulate leaves. Heads orange with 1-seriate (rarely 0) female ligulate ray-flowers, disk-flowers 2-sexual with 5-fid corolla. Involucral bracts 1-seriate more or less connate into a campanulate or cylindric cup. Receptacle fimbrillate. Anther-bases obtuse. Style of disk-flowers with slender truncate and penicillate or shortly appendaged arms. Cypsele linear, compressed or angular, base attenuate with conspicuous basilar callus. Pappus of few (usually 5-6) scales, sometimes aristate.—Species 20.—Warm America.

T. erecta Linn. is used medicinally in Mexico; *T. glandulifera* Schrank in Brazil.

1. **Tagetes erecta** Linn. Sp. Pl. (1753) 887.

A hardy annual, growing about 60 cm. high, erect, branched. Leaves very strong scented, pinnately divided, segments lanceolate-serrate. Flowers of one solid colour the typical colour being lemon-yellow but it ranges from a light sulphur-yellow to a deep orange. Rays sometimes rather 2-lipped and in one of the garden forms they are quilled.

Distribution: Mexico.—Grown in Indian gardens.

The flower has a pungent, bitter, acrid taste; useful in fevers and epileptic fits (Ayurveda).

The leaves are good for piles, kidney troubles, muscular pain; their juice is used for earache and ophthalmia.—The flower is bitter; astringent, carminative, stomachic; good for the teeth and the gums; lessens inflammation; useful in scabies, belching, scorpion and snake poisoning, liver complaints, bleeding piles (Yunani).

The leaves are used as an application to boils and carbuncles; their juice is given in earache.

The flowers are employed in diseases of the eyes and for unhealthy ulcers, internally they are said to purify the blood; their juice is given as a remedy for bleeding piles.

No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

The yellow colouring matter of the flowers has been isolated and identified as the known quercetagetin (H. S. Mahal and K. Venkataraman; 20th Ind. Sc. Congress, Patna 1933).

Arabic: Hajai, Hamahama—; *Bengal:* Genda—; *Bombay:* Guljajari, Makhmal—; *Brazil:* Cravo de defunto—; *Ceylon:* African Marigold—; *English:* French Marigold—; *Gujerati:* Guljharo, Makhamala—; *Hindi:* Genda, Gulatora, Kalaga, Lalamuraga, Makhamali—; *Hova:* Anantsinahimbazaha, Tsipolobazaha—; *Kathiawar:* Gulgoto—; *Madras:* Turukkasamandi—; *Marathi:* Makhamala, Rojiachaphul, Zendu—; *Mexico:* Cempoalxochitt—; *Nasirabad:* Gulgaindo—; *Persian:* Kajekharusa, Sadabarg—; *Punjab:* Genda, Mentok, Sadbargi, Tangla —; *Sanskrit:* Sthulapushpa, Zandu, Zanduga—; *Telugu:* Banti—; *Urdu:* Genda—; *Uriya:* Gendu—.

COTULA (Tourn.) Linn.

Small often creeping annual or perennial herbs. Leaves alternate pinnatifid or pinnatisect, rarely entire or toothed. Heads small, peduncled, heterogamous (rarely homogamous), disciform, yellow. Outer flowers female, 1-2-seriate, fertile; corolla conic or 0. Disk-flowers 2-sexual, fertile, tube slender or stout and 2-winged, limb 4-fid. Involucre hemispheric or campanulate; bracts sub-2-seriate, herbaceous or membranous, margins often scarious. Receptacle naked. Anther-bases obtuse, entire. Style-arms of 2-sexual flower, truncate or obtuse, style of sterile flowers sometimes entire. Achenes of the ray or all stipitate, compressed, nerveless or 2-4-nerved, sometimes sheathed at the top by the base of the corolla, at other times with a short ear-shaped pappus.—Species 50.—Cosmopolitan, especially in the S. Hemisphere.

1. Leaves bipinnatifid or bipinnatisect .... 1. *C. anthemoides.*
2. Leaves 1-2-pinnatifid .... 2. *C. aurea.*

Tonic, antispasmodic, emmenagogue, emetic.

C. aurea Linn. and *C. coronopifolia* Linn. are used medically in Europe; *C. anthemoides* Linn. and *C. multifida* DC. in South Africa.

OFFICIAL:—The flower heads of *C. aurea* Linn. in Spain.

1. **Cotula anthemoides** Linn. Sp. Pl. (1753) 891.—PLATE 537B.

A weak diffuse much-branched usually glabrous annual. Leaves 0.8-2 cm. long, 1-2-pinnatisect, ½-amplexicaul at the base; ultimate segments obtuse or shortly mucronate. Heads 3-5 mm. diam., solitary on the naked filiform peduncles. Achenes of disk-flowers with thick narrow wings.

Distribution: Punjab, Upper Gangetic Plain, Bihar.—China, N. and S. Africa.

The medicinal properties are the same as those of *Matricaria chamomilla* (Yunani).

The plant heated with oil is applied externally in rheumatism.

The infusion is used as an eye wash in most diseases of the eye.

A decoction is a Xosa remedy for head and chest colds. The nostrils are sometimes filled with the crushed leaf for colds.

The Sutos use a decoction of the leaf and root as a colic remedy.

Hindi: Babuna—; *Kashmir:* Tulobe—; *Punjab:* Babuna—; *Suto:* Hlapi-e-nyenyane—; *Urdu:* Babunah—; *Xosa:* unHlonyane—.

2. **Cotula aurea** Linn. Sp. Pl. 1267.—*Matricaria aurea* Boiss. Fl. Or. III (1875) 324.

Habit of a Cotula rather than of Matricaria. Annual, prostrate, nearly glabrous; stems 5-10 cm., decumbent from the root. Leaves 2.5-7.5 cm., 1-2-pinnatifid; segmens very slender, setaceous, entire or divided. Heads peduncled, axillary and terminal, 4-6 mm. diam., subhemispheric; involucral bracts broadly oblong. Female flowers with a flattened 3-4-toothed corolla; corolla lobed at the base, walls very thick below, mouth shortly 4-lobed. Achenes of the ray hardly winged, oblong, flattened, striated; pericarp mucose when moistened; pappus 0 in Indian species (a large auricle in European).

Distribution: Punjab, Orient, N. Africa, Europe.

In Spain, the plant, chiefly the flowers, is used as a tonic, diaphoretic, anthelmintic, antipyretic, antihysteric and for pain in the bowels.

Catalan: Camamilla fina—; *Spanish:* Manzanilla fina—.

CENTIPEDIA Lour.

Annual or perennial herbs. Leaves alternate, often spathulate, entire or coarsely toothed. Heads small, sessile on the branches or racemose, heterogamous, disciform, yellow; outer flowers female, many-seriate, fertile; disk-flowers hermaphrodite, few, fertile. Involucre hemispheric; bracts 2-seriate, subequal and with scarious margins. Receptacle flat or silghtly convex, naked. Corollas all regular, tubular; tube very short; limb in female flowers narrow, 2-3-lobed, in the hermaphrodite flowers broader, campanulate, 4-fid. Anther-bases obtuse, entire. Style-arms of hermaphrodite flowers short, truncate. Pappus 0. Achenes 4-angled; tip obtuse; angles hairy.—Species 5.—Chili, Madagascar, tropical Asia, Australia.

C. orbicularis Lour. is used medicinally in China, the Philippine Islands, and New South Wales.

1. **Centipeda orbicularis** Lour. Fl. Cochinch. (1790) 493.—*Artemisia sternutatoria* Roxb. Fl. Ind. III (1832) 423.—*Dichrocephala* Schmidii Wight Ic. t. 1610.—PLATE 538.

A small annual; stems numerous, 10-20 cm. long, spreading from the root, prostrate, slender, leafy, usually glabrous. Leaves numerous, subsessile, 6-10 by 3-4.5 mm., oblong-spathulate, with few teeth (usually 2 on each side), base tapering. Heads 2.5-4 mm. diam., globose, solitary, axillary, subsessile. Involucral bracts (in flower) small, oblong, with membranous margins. Pappus 0. Achenes minute, 4-angled, bristly on the angles.

Distribution: Throughout India in moist places, Ceylon.—Afghanistan, Malaya, China, Australia, Pacific Islands.

The leaves are hot, sharp, dry, acrid; anthelmintic; appetiser; cause biliousness; cure "vata" and "kapha", leucoderma, diseases of the blood and the skin, hysteria (Ayurveda).

The leaves are sternutatory, expectorant, carminative, emetic, cathartic; enrich the blood, cure nose troubles, night blindness, sore throat, ear pain, amenorrhœa, leucoderma, scabies, ringworm, pains in the joints, hiccough, lumbago; used in ozœna, inflammations.—The oil is used in lumbago (Yunani).

The minute seeds are used as a sternutatory by the Hindus, also the powdered herb. It is administered in ozœna, headaches, and colds in the head. Considered a hot and dry medicine, useful in paralysis, pains in joints, and special diseases; also as a vermifuge.

Boiled to a paste and applied to the cheeks, it is employed in the cure of tooth-ache (Stewart).

The Mundas of Chota Nagpur snuff the crushed plant in fevers and colds.

The herb contains an alkaloid, a glucoside, and traces of saponin; the watery extract increases the force of contraction of the frog's heart, prolongs the systole, and causes heart block in larger doses (Vyas and Sinha; *Ind. Med Gaz.*, 1930).

Arabic: Afkar, Makandash, Uffarkakudush—; *Bengal:* Chhikni, Hanchetagachha, Hanchuti, Mechitta, Nagdowana, Nakkchikni, Pachittie—; *Bombay:* Nagdowana, Nakkchikni, Pachittie—; *Chinese:* Shih Hu Sui—; *English:* Sneezeweed, Sneezewort—; *Gujarat:* Chhikani—; *Hindi:* Nagdowana, Nakchhikni, Nakkchikni, Pachittie—; *Indo China:* Co the, Thach ho tuy—; *Malaya:* Chikkana, Chhikika, Chu tsao, E tai shih, O tai shih, Pe kong chau, Shih u sui, Yoo pak seek—; *Marathi:* Nakashikani, Narasinkani—; *Mundari:* Acuara, Acusing—; *Persian:* Gawejahan—; *Sanskrit:* Chhikkani, Chhikkika, Ghranadukhada, Kruranasa, Kshavaka, Kshavakrita, Sanvedanapatu, Tikshna, Ugra, Ugragandha—; *Santal:* Bediachim—; *Sind:* Afkar—; *Sinhalese:* Wisaduli—; *Tagalog:* Harangan—; *Urdu:* Nakachhikani —; *Visayan:* Harangan, Pissic—.

TANACETUM Linn.

Annual or perennial herbs. Leaves usually pinnatisect. Heads corymbose (rarely large, long-peduncled, and solitary), heterogamous or homogamous, disciform, yellow; outer flower 0 or female, 1-seriate, fertile, terete or compressed, 2-3-fid; disk-flowers hermaphrodite, fertile, tube stout cylindric limb 5-fid. Involucre usually broad and short; bracts many-seriate, appressed, margins often scarious and brown, outer smaller. Receptacle flat or convex, naked. Anther-bases obtuse, entire. Style arms of hermaphrodite with truncate

penicillate tips. Achenes compressed, 5-angled or ribbed, or of the ray triquetrous, truncate; pappus annular or coroniform or 0, rarely a dimidiate auricle.—Species 30.—N. hemisphere.

1. Leaves palmately 2-pinnatisect .... 1. *T. gracile.*
2. Leaves 1-2-pinnatisect .... 2. *T. fruticulosum.*

The herb is anthelmintic, tonic, emmenagogue.

T. vulgare Linn. is used medicinally in Europe.

Official :—The flower heads of *T. vulgare* Linn. in Belgium and Portugal.

1. **Tanacetum gracile** Hook. f. and Th. in Hook. f. Fl. Brit. Ind. III, 318.

A very hairy herb. Stems 30-60 cm. high, very slender, many from a woody stock, branched above. Branches slender, spreading. Leaves 1.3-2.5 cm., few, scattered, twice pinnately cut, segments very slender. Heads 4 mm. diam., in small corymbs at the end of the branches. Bracts broadly oblong, membranous, glabrous, pale. Fruit (achene) obovate with a terminal cupula.

Distribution: Alpine W. Himalaya, from Kashmir to N. of Kumaon, 13,500 ft.

At Pab in Jhalawan, the plant is considered as a cure for fevers (Hughes-Buller).

Pab: Drane—.

2. **Tanacetum fruticulosum** Ledeb. Fl. Alt. IV, 58; Ic. t. 38.

A very hairy perennial herb. Stems many from the woody root, 25-35 cm. high, erect, leafy upwards. Leaves all on the stem (not basal), 6-13 mm. long, once or twice pinnately cut, segments spreading, linear, blunt. Heads many, stalked or stalkless, 6 mm. diam. Bracts surrounding the flower-heads broadly oblong, nearly hairless, all membranous and pale, or margins faintly coloured.

Distribution: W. Himalaya, 12,000—15,000 ft.—Afghanistan, Altai Mts.

The herb is used as a tonic and anthelmintic.

ARTEMISIA Linn.

Herbs or shrubs usually strongly scented. Leaves alternate, entire, incised or 1-3-pinnatisect. Heads small, solitary or fascicled, racemose or panicled, never corymbose, heterogamous with the outer flowers female, fertile, 1-seriate, or homogamous, the female flowers wanting; inner or disk-flowers hermaphrodite, fertile or sterile. Involucre ovoid or broadly campanulate; bracts few-seriate with scarious margins, the outer shorter. Receptacle flat, convex or hemispheric, naked or hirsute. Corollas of female flowers slender, tubular, shortly 2-3-fid at the apex; corollas of hermaphrodite flowers regular, tubular, the limb slightly enlarged or campanulate, 5-fid. Anther-bases obtuse, entire. Style-arms of hermaphrodite flowers truncate, usually penicillate; tips often connate in the sterile flowers. Pappus 0. Achenes very small, ellipsoid, oblong or subobovoid, faintly striate, glabrous or pilose.—Species 280.—Northern hemisphere, S. Africa, S. America.

A. Heads heterogamous, outer flowers female, disk-flowers hermaphrodite, sterile. Receptacle naked		
1. Perennial	8.	*A. dracunculus.*
2. Annual	9.	*A. annua.*
3. Annual or rootstock perennial	1.	*A. scoparia.*
B. Heads homogamous. Flowers all fertile. Receptacle naked ..	2.	*A. maritima.*
C. Heads heterogamous. Ray-flowers female, disk-flowers hermaphrodite, all fertile. Receptacle naked or puberulous in *A. persica*		
1. Leaves large, ovate, lobed, laciniate or 1-2-pinnatipartite. Perennials with usually small heads	3.	*A. vulgaris.*
2. Leaves long-petioled, ovate-pinnatisect	4.	*A. sacrorum.*
3. Perennials with rather large heads	5.	*A. persica.*
D. Heads heterogamous. Ray-flowers female, disk-flowers hermaphrodite, both fertile. Receptacle covered with long hairs		
1. Perennial	6.	*A. absinthium.*
2. Annual or biennial	7.	*A. sieversiana.*

The genus is bitter, stimulant, tonic, deobstruent, antispasmodic and anthelmintic.

The following species are used medicinally in Europe—*A. absinthium* Linn., *A. abrotanum* Linn., *A. arborescens* Linn., *A. cærulescens* Linn., *A. campestris* Linn., *A. dracunculus* Linn., *A. gallica* Willd., *A. glacialis* Linn., *A. herba-alba* Arso., *A. hispanica* Lam., *A. maritima* Linn., *A. mutellina* Willd., *A. pontica* Linn.,

A. scoparia Waldst. and Kit., *A. spicata* Wulf., *A. vallesiana* Lam., *A. vulgaris* Linn.—; in Palestine and Syria—*A. judaica* Linn., *A. sieberi* Bess.—; in Arabia and Egypt—*A. judaica* Linn.—; in Persia and Turkistan—*A. sina* Berg., *A. vahliana* Kosteletzky—; in China—*A. annua Linn.*, *A. apiacea* Hance, *A. capillaris* Thunb., *A. japonica* Thunb., *A. keiskeana* Miq., *A. stelleriana* Bess., *A. vulgaris* Linn.—; in Indo China—*A. abrotanum* Linn., *A. annua* Linn., *A. apiacea* Hance, *A. capillaris* Thunb., *A. carvifolia* Roxb., *A. sina* Berg., *A. japonica* Thunb., *A. keiskeana* Miq., *A. maritima* Linn., *A. vulgaris* Linn.—; in Malaya— *A. maritima* Linn., *A. vulgaris* Linn.—; in the Philippine Islands—*A. vulgaris* Linn.—; in North America—*A. absinthium* Linn., *A. ludoviciana* Nutt., *A. santonicum* Linn.—; in California—*A. californica* Lees., *A. tridentata* Nutt.—; in Mexico—*A. mexicana* Willd.—; in North Africa and the Canary Islands—*A. ramosa* Sm.—; in South Africa—*A. afra* Jacq.—.

A. abrotanum Linn. contains abrotine, an alkaloid of unknown composition.

Official :—The leaves of *A. absinthium* Linn. (Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Japan, Norway, Russia, Sweden, Switzerland, Turkey); *A. mollis* Gay=*A. chinensis* Burm. non Linn. (Portugal).

The leaves and flower heads of *A. vulgaris* Linn. in France and Switzerland.

The flower heads of *Artemisia spp.* (Denmark, Great Britain, Italy, Portugal, Spain); *A. abrotanum* Linn. (Portugal); *A. absinthium* Linn.=*Absinthium officinale* Brot. (Portugal); *A. arborescens* Linn. =*Absinthium arborescens* Brot. (Portugal); *A. cina* Berg. (Austria, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Portugal, Russia, Spain, Switzerland); *A. cina* Willkomm (Sweden); *A. maritima* Linn. (Italy),—var. *pauciflora* Weber (Spain);—var. *pauciflora* Led. (France),—var. *α-Stechmaniana* Besser (Belgium); *A. paniculata* Lamk. (Portugal); *A. pauciflora Stechmann* (Portugal); *A. pauciflora* Weber (Denmark); *A. procera* Willd. (Portugal); *A. vulgaris* Linn.=*A. officinalis* Gat. (Portugal).

The herb of *A. Absinthium* Linn. in Austria.

1. **Artemisia scoparia** Waldst. and Kit. Descr. et Icon. Pl. Rar. Hung. I (1802) 66, t. 65.—Plate 539B.

Annual or biennial, 0.3-0.9 m. high, faintly odourous; stem very slender, scarcely as thick as a quill, erect, grooved, purplish, glabrous or more or less pubescent, simple at the base, paniculately branched above; branches sometimes almost capillary, purplish. Leaves deep green; the radical ones petioled, ovate in outline, 1-3-pinnatisect, the segments linear; cauline leaves filiform. Heads 2-2.5 mm. diam., sessile or on short capillary pedicels, secund, in slender panicled racemes; female flowers in each head fertile, with very minute corollas; hermaphrodite flowers sterile, with much larger corollas. Involucral bracts glistening, ovate-oblong, obtuse, with broad scarious margins, the inner bracts about twice as large as the outer. Achenes very minute, ellipsoid, about 0.4 mm. long.

Distribution: W. Himalaya, Punjab, Upper Gangetic Plain.—China, Japan, Afghanistan, Central Europe.

In the Punjab, the smoke is considered good for burns, and the infusion is given as a purgative (Stewart).

At Las Bela, the plant is considered as a cure for pain in the ear (Hughes-Buller).

Bombay: Churisaroj, Danti—; *Las Bela:* Gajar—; *Punjab:* Biur, Dona, Durunga, Jhan, Lasaj, Marua, Pilajau—.

2. **Artemisia maritima** Linn. Sp. Pl. (1753) 846.—Plate 539A.

A deciduous shrub 30-45 cm. high with stems up to 1.3 cm. diam. Bark rough, fibrous. Twigs striate, hoary or somewhat white-wooly. Leaves 1.3-5 cm. long, 2-pinnatisect; segments many, small, spreading, linear, obtuse, more or less grey- hoary or -tomentose, bluish green, the upper leaves simple and linear. Petioles slender, up to 2.5 cm. long, much shorter towards the ends of the shoots. Heads homogamous, 3-8-flowered, oblong or ovoid, a little more than 2.5 mm. long, sessile or nearly so, in spicate fascicles in the axil of a small linear or subsetaceous leaf. Flowers yellowish.

Involucral bracts linear-oblong with scarious margins. Corolla with a short cylindric tube and narrowly campanulate limb.

Distribution: W. Himalaya, from Kashmir to Kumaon 7,000—11,000 ft.—Coasts of Europe and saline tracts of N. Asia.

The seeds are bitter, hot, pungent, with a sharp taste; stomachic, appetiser, aphrodisiac, anthelmintic; cure "tridosha", indigestion, abdominal pain, mucous diarrhœa (Ayurveda).

The herb has a bitter bad taste; laxative, anthelmintic, alexiteric, vulnerary; stops expectoration and removes bad humours; cures scorpion-sting; useful in toothache, griping, ophthalmia, and inflammation (Yunani).

In Bombay, the Hakims prescribe it in doses of 2 to 3 drachms as an anthelmintic, and also deobstruent and stomachic tonic. In the form of a poultice, they use it to relieve the pain caused by the bites of scorpions and other venomous reptiles.

It is indigenous to Southern Afghanistan and Baluchistan, and is much used as an antiperiodic. An infusion (and also decoction) of the fresh plant has been very successfully used by me in cases of ague, intermittent and remittent fever. It is a very useful febrifuge and deserves trial (B. D. Basu).

At Kirani, near Quetta, the plant is given to children for stomach-ache; in Sanjawi, it is a cure for jaundice (Hughes-Buller).

Kirmani powder consisting of the flower heads with an admixture of small stalks and leaves of *A. maritima* was tried as an anthelmintic in cases of roundworms and was found to be efficacious in expelling them with the aid of castor oil (Koman).

In snake-bite and scorpion-sting the flower heads are made into a poultice and applied to the part affected. The treatment is useless whether it be snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

The flower heads are ineffective as an anthelmintic (Caius and Mhaskar).

Arabic: Afsanthinulbarh, Sarifun, Sariqun, Shih, Shiharmani—; *Bhotia:* Safedpurcha—; *Bombay:* Kiramaniova—; *Catalan:* Donsell

mari—; *English:* Drooping Sea Wormwood, English Sea Wormwood, French Sea Wormwood, Levant Sea Wormwood, Roman Wormwood, Santonica, Sea Mugwort, Sea Wormwood, Wormseed—; *French:* Absinthe maritime, Armoise maritime—; *Gujerati:* Chhuvariajamoda, Kirmanidinechi—; *Hindi:* Ajavayana, Chhuari—; *Indo China:* Chi nai—; *Kirani:* Zher—; *Marathi:* Kirmaniova, Surabandi—; *Persian:* Afsanthinulbarh, Darmaneh, Sariqun, Shih—; *Sanjawi:* Tarkhasperah—; *Sanskrit:* Chhara, Chauhara, Gandha, Jantunashana, Khurapushpika, Parasi, Yavani, Yavaniya—; *Spanish:* Ajengo maritimo—; *Urdu:* Darmanah—.

3. **Artemisia vulgaris** Linn. Sp. Pl. (1753) 848.—PLATE 540.

Perennial, shrubby, aromatic, 0.6-2.4 m. high, pubescent or villous; stems leafy, paniculately branched. Lower leaves 5-10 by 2.5-5 cm., petioled, ovate in outline, with stipule-like lobes at the base, deeply pinnatisect, the lobes entire, toothed or again pinnatisect, all finely pubescent above, white-tomentose beneath. Upper leaves smaller, 3-fid or entire, lanceolate. Heads 3-4 mm. long, ovoid or subglobose, solitary or 2 or 3 together, sessile or very shortly pedicelled, subsecund, in spicate suberect or horizontal panicled racemes; outer flowers female, very slender; inner hermaphrodite, fertile. Involucral bracts villous and with scarious margins; the outer ovate, acute; the inner oblong, obtuse, much larger than the outer, sometimes almost wholly membranous. Achenes oblong-ellipsoid, minute.

Distribution: Throughout the hilly districts of India, Ceylon.—Temperate Europe and Asia, Siam, Java.

The plant has a hot, sharp, pungent taste; alexiteric, appetiser; cures "kapha", "vata", asthma, itching (Ayurveda).

The plant is considered to be a valuable stomachic, deobstruent, and antispasmodic; it is prescribed in infusion and electuary in cases of obstructed menses and hysteria. Externally, it is used in fomentations given in skin diseases and foul ulcers as an alterative.

The expressed juice is used in diseases of children. It is applied to the head of young children for the prevention of convulsions.

The leaves and tops are administered in nervous and spasmodic affections connected with debility, in asthma and diseases of the brain.

In Afghanistan, and throughout India, a strong decoction is given as a vermifuge, and a weak one to children in measles. An infusion is given as a tonic.

The plant is much used medicinally in Indo China, where the leaves and the flowers are considered as aromatic, emmenagogue, stomachic, antispasmodic, and anthelmintic. The boiled leaves are used as a poultice in headache; dried and cut into small fragments they are used to cauterize wounds.

In China and Japan, inflammable cones or " moxa " are obtained by grinding the leaves in a stone mortar with water, separating the coarser particles, and drying what remains. Moxibustion, or the method of cauterizing the skin by burning, is resorted to for a very large number of diseases, from itch to sterility.

In Malaya, the leaves are employed as a carminative and hæmostatic.

The tonic and stomachic properties of the plant are well known in the Philippine Islands. An infusion of the leaves is commonly used as an emmenagogue.

The plant is prescribed by Sushruta in the treatment of snake-bite and scorpion-sting; but the plant is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Annam: Ngai diep—; *Bombay:* Nagdona—; *Canarese:* Davana, Manjipatri—; *Catalan:* Altimira—; *Chinese:* Ai—; *Deccan:* Dawan, Randawan—; *Dehra Dun:* Samri, Sarmi—; *Dutch:* Bijvoet, Sint Jans Gordel, Sint Jans Kruid—; *English:* Fleabane, Indian Wormwood, Motherwort, Mugwort—; *French:* Armoise, Artémise, Ceinture de Saint Jean, Couronne de Saint Jean, Encens, Encens de mas, Fleur de Saint Jean, Herbe ă cent goûts, Herbe Saint Jean, Herbe de Saint Jean, Remise—; *Garhwal:* Kunja—; *German:* Alsei, Beifuss, Beiposs, Besenkraut, Bibes, Biboth, Bibs, Biefoth, Biermersch, Buck, Budschen, Kampferkraut, Roterbock, Sant Johannis Guertel, Weiber-

kraut, Wiegenkraut, Wiesenkraut, Wildes Wurmkraut, Wurmtod—; *Hindi:* Dona, Gathivana, Majtari, Mastaru, Nugduna—; *Indo China:* Cuu ngai da, Lau cao, Ngai, Ngai cuu, Thuoc cau, Thuoc cuu, Yomogi—; *Italian:* Amarella, Canapaccia, Assenzio di siepe—; *Japanese:* Yomogi—; *Lepcha:* Taknyel—; *Malaya:* Ai, Chi ai, Khee ngai, Ki ai, Ngai—; *Malayalam:* Appa, Damanakam, Kattuchatti, Makkippu, Mashipatri, Nilampala, Rirunittipacha—; *Marathi:* Gathona, Surband—; *Nepal:* Titapat—; *Philippines:* Santa Maria—; *Punjab:* Afsuntin, Banjiru, Buimadaran, Chambra, Puujan, Tarkha, Tataur, Ubusha—; *Roumanian:* Pelin negru, Pelinita—; *Russian:* Cherdonilnik—; *Sanskrit:* Barha, Barhikusum, Barhipushpa, Granthika, Granthiparna, Granthiparnaka, Guchhaka, Gutthaka, Kakapushpa, Kukura, Nagadamani, Nilapushpa, Saraparni, Shuka, Shukabarha, Shukachhada, Shukapuccha, Sthauneya, Sugandha, Svaramaguchhaka, Tailaparnaka, Vanyadamanaka, Vishirnakhya—; *Saora:* Adavidhavanamu—; *Sinhalese:* Walkolondu—; *Spanish:* Artemisia—; *Tagalog:* Camaria, Tinisas—; *Tamil:* Mashibattiri, Tirunama—; *Telugu:* Davanamu, Mashipatri—; *Uriya:* Doyona, Gonddhomaro, Nagodoyona—.

4. **Artemisia sacrorum** Ledeb. Fl. Alt. IV, 72.—PLATE 541B.

A deciduous bushy shrub usually 0.3-0.6 m. high but occasionally up to 1.2 m. high and stems up to 2.5 cm. diam., often decumbent. Bark reddish brown peeling off in rough loose fibrous strips. Twigs striate, pubescent. Leaves 2.5-5 cm. long, 2-pinnatisect; segments many, 2.5-7.5 mm. long, oblong, acute, undivided or more usually pectinately pinnatifid, green and hoary on both surfaces, ultimately glabrescent above; rhachis simple or pectinately winged. Heads heterogamous 15-30-flowered, broadly hemispheric, about 4 mm. across, pedicelled, nodding, in slender compound pubescent racemes. Pedicels up to 5 mm. long. Flowers yellow. Involucral bracts with scarious margins.

Distribution: Kunawer, Kumaon on interior ranges bordering Tibet between 10,000 and 12,000 ft.—Dahuria, Siberia, Central and S. Russia.

The plant is said to be given to horses in affections of the head (Stewart).

Bhotia: Kalapurcha—; *Ladak:* Burmack, Tatwen—; *Punjab:* Burnak, Chumbar, Jau, Munya, Niurtsi, Tatwen, Zbur—.

5. **Artemisia persica** Boiss. Fl. Or. III, 373.—PLATE 541A.

Tall, erect, hoary with white tomentum, paniculately branched above, leafy; stem 0.9-1.2 m. high, grooved and ribbed; branches long, suberect. Leaves sessile or petioled, small, ovate, or flabellate decompoundly pinnatisect, segments minute, linear or obovate obtuse, spreading, rhachis simple or lobulate. Heads numerous, yellow, 4 mm. diam., subglobose, rather remote, pedicelled, secund, nodding in short or long axillary strict erect racemes. Involucral bracts tomentose, outer linear, green, inner orbicular, broadly scarious; receptacle small, convex, obscurely pubescent. Corolla of hermaphrodite flowers very short, almost cupular, glabrous or pubescent.

Distribution: W. Tibet, 9,000—14,000 ft.—Afghanistan, S. Persia, Kurdistan.

The plant is used as a tonic, febrifuge, and vermifuge (Bellow).

Arabic: Afsantinulbarh, Sariqun, Shih—; *Gujerati:* Pardesidauno—; *Marathi:* Davana—; *Persian:* Afsantinulbarh, Sariqun, Shih—.

6. **Artemisia absinthium** Linn. Sp. Pl. (1753) 848.—*Absinthium vulgare* Gaertn. Fruct. II, t. 164.—PLATE 542B.

A perennial, hoary, silky, pubescent, herbaceous plant, very aromatic. Stem erect, angular, ribbed, 0.3-0.9 m. Leaves ovate or obovate, 2.5-5 cm., unequally 2-3-pinnatifidly cut into spreading linear or lanceolate, obtuse segments, hoary on both surfaces; radical and lower cauline narrowed into winged petioles. Heads 8-6 mm. diam., numerous, but hardly crowded, pedicelled, hemispheric in drooping, secund racemes terminating the branches. Flowers yellow. Ray-corolla dilated below. Outer invoulcral bracts oblong, hoary, narrowly scarious, inner orbicular, broadly scarious. Receptacular hairs long, straight. Anthers acuminate, not aristate. Achenes elliptic oblong, or somewhat obovoid, 1 mm. long.

Distribution: Kashmir, 5,000—7,000 ft.—N. Asia, Afghanistan, westwards to the Atlantic.

The whole herb is an aromatic tonic, and formerly enjoyed a high reputation in debility of the digestive organs. It was also regarded as an anthelmintic. Before the discovery of Cinchona, it was largely used in intermittents. It exercises a powerful influence over the nervous system, and its tendency to produce headache and other nervous disorders is well known by travellers in Kashmir and Ladak, who suffer severely when marching through the extensive tracts of the country covered with this plant.

Prescribed in the form of a poultice or fomentation as an antiseptic and discutient.

It yields by distillation a dark green or yellow oil, having a strong odour of the plant and an acrid taste. In large doses it is a violent narcotic poison.

Neither the herb nor the oil are effective as anthelmintics against hookworms (Caius and Mhaskar).

Arabic: Afsantin—; *Bologna:* Zicus—; *Catalan:* Donsell—; *Como:* Medegh—; *Danish:* Malurt—; *Deccan:* Vilayatiafsantin—; *Dutch:* Alsem, Groote Alsem—; *English:* Absinth, Madderwort, Mingwort, Mugwort, Old Woman, Warmot, Wermuth, Wormwood—; *French:* Absin menu, Absinthe, Absinthe commune, Absinthe vulgaire, Alliĕne, Aluine, Aluyne, Alvine, Aoussin, Armoise amère, Grande Absinthe, Herbe sainte, Herbe aux vers—; *Friuli:* Assinz, Sinz—; *Genoa:* Bonmegu, Erba medgu—; *German:* Aelsch, Allsam, Allsei, Alsam, Alsch, Alsen, Baermede, Bitteralsen, Bitterbeifuss, Bitterkraut, Elch, Else, Elzkraut, Ilsem, Kampferkraut, Kittelkraut, Knoopvanalsen, Magenkraut, Malnit, Meelrasch, Pardehan, Pardesan, Vraemte, Waermde, Waermkraut, Warmuede, Wermde, Weissrauch, Wermuth, Wiegenkraut, Woerken, Woermd, Woermke, Wormeth, Wraemte, Wroembk, Wuermken, Wurmei, Wurmet, Wurmtod—; *Greek:* Apsinthion—; *Hindi:* Vilayatiafsantin—; *Italian:* Assenzio—; *Lombardy:* Incens, Incens de bigat—; *Malayalam:* Shulabandha—; *Malta:* Wormwood, Assenzio, Assenziu—; *Norwegian:* Malurt—; *Padua:* Bun maja—; *Pavia:* Assenzi—; *Persian:* Afsantin—; *Piedmont:* Bonme, Bonmi, Dusang, Erba meja, Erba mia, Fort, Incenso, Insens, Insens grousser, Medighdt, Ourtmia, Ourtmiglia—;

Potenza: Naseienzo—; *Reggio:* Aluina, Alvina, Asseinzi—; *Romagna:* Absanta, Absent, Absent rumen, Absent dal foj lerghi—; *Roumanian:* Pelin—; *Russian:* Polin—; *Sanskrit:* Damar—; *Spanish:* Ajenjo—; *Treviso:* Bon maistro—; *Tuscany:* Assenzo—; *Verona:* Medego maistro—.

7. **Artemisia sieversiana** Willd. Sp. Pl. III, 1845.—Plate 542A.

Very similar in many respects to *A. absinthium* Linn., but annual (in the Indian specimens), with much larger heads, distant on the long, lax recemes, and the anthers are aristate. Hoary, pubescent, stem erect, angled, ribbed, simple or paniculately branched above. Leaves mostly petioled, broadly ovate, 2-pinnatisect, segments obtuse and obscurely lobed, hoary on both surfaces. Heads 6-13 mm., diam. broadly hemispheric, pedicelled, secund, nodding, distant, in lax long racemes, terminating the branches. Outer involucral bracts green, hoary, inner broadly scarious. Receptacular hairs long, straight.

Distribution: W. Himalaya, from Kashmir to Lahul, 8,000—10,000 ft.—From China Westwards to S. Russia.

The plant is acrid, bitter, hot, dry, pungent, with the flavour; cardiotonic, aphrodisiac, alexipharmic, tonic; improves taste and appetite; useful in leucoderma, diseases of the blood, itching, sweating, "tridosha", amenorrhœa, dysmenorrhœa; cures "vata", "kapha", tumours, diseases of the spleen and of the heart (Ayurveda).

The plant has a bitter bad taste with a flavour; anthelmintic, aphrodisiac, emmenagogue; stimulant to the heart and the brain; useful in hypochondriasis, jaundice, dropsy, gout, pains in the joints, troubles of the stomach, the liver, the blood, and the spleen; used in hysteria (Yunani).

The plant is a tonic, deobstruent, febrifuge, and anthelmintic. It is applied externally as a discutient and antiseptic.

Arabic: Afsantin—; *Bengal:* Dana, Dona—; *Bombay:* Downa—; *Canarese:* Davana—; *Gujerati:* Damro—; *Hindi:* Dauna—; *Marathi:* Davana, Ranadavana—; *Persian:* Afsantin—; *Sanskrit:* Agnidama-

naka, Bahukantaka, Brahmajata, Damana, Damanaka, Damani, Dandi, Danta, Devashekhara, Gandhotkata, Guchhaphala, Jatila, Kshudradussparsha, Kshudrakantakari, Kulapatra, Kulapatraka, Madanaka, Muni, Munipatra, Panduraga, Patri, Pavitraka, Pundarika, Pushpachamara, Tapasapatri, Tapaswipatra, Tapodhana, Vanadamanaka—; *Urdu:* Afsantin—.

8. **Artemisia dracunculus** Linn. Sp. Pl. (1753) 849.

A perennial, green, erect, hairless herb. Stems 30-60 cm. high, grooved and ribbed. Leaves 2.5-3.8 cm. long; basal ones quite entire or absent; stem-leaves sessile, linear or linear-oblong, sharp-pointed or toothed. Flower-heads almost round, 3 mm. diam., sessile or not, pale, shining, in panicled racemes, sometimes clustered in threes, horizontal or nodding. Flowers numerous. Bracts hairless, broadly oblong, blunt, with broad membranous margins and a green disk.

Distribution: W. Himalaya, 14,000—16,000 ft.—Afghanistan, W. Asia, S. and Central Russia.

The aromatic leaves are credited with aperient, stomachic, stimulant, and febrifuge properties.

Dutch: Dragon—; *English:* Little Dragon Mugwort, Tarragon—; *French:* Dragon, Dragonne, Estragon, Fargon, Herbe au dragon, Herbe dragonne—; *German:* Dragun, Kaisersalat—; *Italian:* Dragontea—; *Portuguese:* Estragao—; *Roumanian:* Tarhon—; *Russian:* Estragon—; *Spanish:* Dragoncillo, Estragon—.

9. **Artemisia annua** Linn. Sp. Pl. (1753) 847.

Annual, glabrous. Stem high, furrowed, passing into an ample spreading branching compound panicle. Radical leaves long-petiolate, in outline triangular-ovate, bipinnatisect; primary segments petiolulate, secondary ones oblong with acute, dentate pinnatipartite lacinulæ. Primary rhachis without teeth. Floral leaves sessile, with linear setaceous teeth. Heads very small, globose, pedicellate, hanging. Outer leaves of involucre few, oblong-linear, herbaceous; inner ones suborbiculate, scarious.

Distribution: Orient, Siberia.

A popular remedy in Indo China. A good stomachic and diuretic. Used in jaundice and in skin diseases.

In China and Malaya, the dried leaves and stalks are used in skin diseases.

Chinese: Huang Hua Hao—; *Indo China:* Che noi, Hoang hoa cao, Nhan tran—.

TUSSILAGO (Tourn.) Linn.

Species 1.—Europe, N. Africa, Asia.

T. farfara Linn. is used medicinally in China, Annam, Indo China, and Malaya.

OFFICIAL:—The leaves of *T. farfara* Linn. (Austria, Denmark, Germany, Norway, Russia, Sweden, Turkey); =*T. vulgaris* Lamk. (Portugal).

The flower heads of *T. farfara* Linn. in France.

1. **Tussilago farfara** Linn. Sp. Pl. (1753) 865.—PLATE 543A.

A white, woolly, scapigerous herb, with a perennial rootstock. Leaves long-petioled, all radical, coming after the flowers, orbicular, cordate, toothed, 7.5-25 cm. broad, cobwebby above, white tomentose beneath. Scapes 1 or more, 10-25 cm., tomentose. Heads heterogamous, radiate, bright yellow, drooping in bud, 2.5-3.8 cm. diam. Ray-flowers female, multiseriate, fertile, ligule narrow, spreading. Disk-flowers hermaphrodite, sterile, tubular, limb elongate, 5-fid. Involucre campanulate or cylindric; bracts 1-seriate, equal, with a few very small outer ones. Receptacle flat, naked. Anther-bases entire or subauricled. Style-arms of hermaphrodite flowers entire, obtuse. Achenes of female flowers linear, 5-10-ribbed, with slender rough pappus hairs; of hermaphrodite flowers slender, empty, pappus scanty.

Distribution: W. Himalaya, from Kashmir to Kumaon, 6,000—11,000 ft.—N. and W. Asia, N. Africa, Europe.

The leaf is used to remove " vata ". The cotton-like down is used as a styptic (Ayurveda).

The plant is bitter and carminative. The roots and leaves are used in chronic bronchitis, asthma, chest complaints, inflammations; they are maturant, and abortifacient (Yunani).

The leaves are sometimes applied to wounds in Europe; they are smoked like tobacco, as a domestic remedy for asthma. Pliny records the leaf being used for smoking, and recommends both roots and leaves as a remedy for obstinate colds and coughs.

In China, the flowers are used as an expectorant in cough, asthma, apoplexy, and phthisis.

Arabic: Afanjiwun—; *Catalan:* Pota de cabal—; *Chinese:* K'uan Tung Hua—; *Danish:* Foeldfod, Hestehov—; *Dutch:* Hoefblad, Klein hoefblad—; *English:* Asses' foot, Ass's-foot, Bull-foot, Bull's Foot, Clatter-clogs, Clayt, Clayweed, Cleats, Clot, Colt Herb, Colt's-foot, Coughwort, Cout-fit, Cowheave, Dishalaga, Dove-dock, Dummy Weed, Foalfoot, Foal's Foot, Foilefoot, Hogweed, Hoofs, Horse-hoof, Horse-hove, Son-before-the-Father, Sow Foot, Tushalan, Tushylucky Gowan—; *French:* Chou de vigne, Filius ante patrem, Herbe aux pattes, Herbe de saint Guérin, Herbe de saint Quirin, Pas d'âne, Pas de cheval, Pas de poulain, Procheton, Racine de peste, Taconnet, Tussilage, Tussilage commun—; *German:* Ackerlattich, Auflattig, Berglaetsche, Brandlattich, Brandlatsche, Brustlattich, Derrelatten, Eselfuss, Eselhuf, Fahlenfuss, Feldlattich, Foelfod, Fuelifuess, Haberlattich, Haferlattich, Hoaflotcher, Huflattich, Hundblume, Hustenkraut, Kuhblume, Labaschen, Latten, Lehmblatt, Logjehn, Loedke, Maergabluemli, Negenkraftkraut, Pappenmuentz, Pferdehuf, Querniskraut, Rosshuf, Rosslattich, Sandblatt, Sandkraut, Sommertuerle, Weisslabeschen, Werschlabeschen, Zeitroeslein—; *Greek:* Bichion—; *Hindi:* Watapana—; *Italian:* Farfarello, Farfaro, Farfugio, Fayfaro, Unghia cavallina—; *Languedoc:* Pepoulit—; *Malaya:* Kuan tung hua, Toong fah, Tun hua—; *Norway:* Hestehof—; *Persian:* Fanjiwun—; *Portuguese:* Farfara, Tussilagem—; *Punjab:* Watpan—; *Roumanian:* Podbeal, Podbol—; *Russian:* Bielakopitnik—; *Spanish:* Una de caballo—; *Swedish:* Haesthov, Haetshof—; *Urdu:* Fanjiwun—.

DORONICUM Tourn. ex Linn.

Perennial herbs. Leaves alternate, radical long-petioled; cauline distant, often amplexicaul. Heads large, long-peduncled heterogamous, radiate, yellow; ray-flowers female, 1-seriate, fertile, ligule elongate entire or 2-3-toothed; disk-flowers hermaphrodite, fertile, tubular, limb 5-fid. Involucre broadly campanulate or hemispheric; bracts 2-seriate, subequal, herbaceous, acuminate; receptacle hemispheric, naked. Anther-bases entire or subauricled. Style-arms of hermaphrodite linear, tip rounded or truncate and penicillate. Achenes of hermaphrodite oblong-turbinate, 10-many-ribbed; pappus-hairs copious, short or long, rigid; of female (rarely of all) often 0.—Species 25.—N. temperate regions of Old World.

1. Leaves all narrowed into short half-amplexicaul petioles .... 1. *D. hookeri.*
2. Leaves broadly ovate, sinuate-toothed .... 2. *D. roylei.*

Narcotico-acrid.

The following species have been used medicinally in Europe—*D. austriacum* Jacq., *D. Columnae* Terrore, *D. pardalianches* Linn., *D. plantagineum* Linn.—.

1. **Doronicum hookeri** C. B. Clarke in Hook. f. Fl. Brit. Ind. III, 332.—PLATE 543B.

A robust herb, 0.3-0.6 m. high. Radical leaves 0, or soon withering; cauline 10-15 by 2.5-5 cm., often unequal-sided. Leaves all narrowed into short, ½-amplexicaul petioles, oblong or elliptic lanceolate, obtuse or acute, entire or irregularly toothed. Heads 1-2, 6.3 cm. diam. glandular-pubescent. Involucral bracts ovate-lanceolate, acuminate. Ligules about as long. Achenes all pappose. Pappus short, reddish.

Distribution: Sikkim Himalaya, 12,000—14,000 ft.

The root is an aromatic tonic.

2. **Doronicum roylei** DC. Prodr. VI, 221.

An erect, perennial herb. Stem 0.6-1.2 m. high, branched above, more or less hairy. Leaves 10-12.5 cm. long, broadly ovate, sinuate toothed, acute, rounded or cordate at the base, basal leaves with a

stalk 10-15 cm. long, upper ones stem-clasping. Flower-heads yellow, few or many, 2.5-5 cm. diam., glandular-hairy on slender stalks swollen at the tip. Bracts 1.3-1.7 cm. long, long-pointed. Ligules nearly as long. Fruit (achene) deeply grooved, all hairless, or the outer sparingly hairy. Pappus short, reddish, only on the inner flowers.

Distribution: W. Himalaya, from Kashmir to Garhwal, up to 10,000 ft.

The root is bitter; pectoral, carminative, cardiotonic, stomachic, alexiteric; applied to bubœs; used in cough, chest troubles, inflammations, headache (Yunani).

The root is used to prevent giddiness on ascending heights (Baden Powell).

Persian, Punjab: Darunajakrabi—; *Urdu:* Darunaj—.

EMILIA Cass.

Annual or perennial often glaucous herbs, glabrous or hairy. Leaves variable; radical leaves crowded at the base of the stem, petiolate, entire, toothed or pinnatifid; cauline leaves few, alternate, usually amplexicaul and auricled. Heads on long peduncles, solitary or laxly corymbose, without bracteoles at the base, homogamous, discoid; flowers all hermaphrodite, fertile, purple or red. Involucre cylindric; bracts 1-seriate, equal, free or more or less cohering, striate. Receptacle flat, naked. Corollas tubular; limb elongate, cylindric, shortly 5-fid. Anther-bases obtuse, subentire. Style-arms subterete, ending in a short obtuse or elongate acute appendage. Pappus-hairs copious, white, soft, very slender. Achenes subterete, or angled and 5-ribbed, glabrous or scabrid on the angles.—Species 5.—Palæotropics.

E. sonchifolia DC. is used medicinally in Indo China, the Gold Coast, La Reunion; *E. ascendens* DC. and *E. graminea* DC. in Madagascar.

1. **Emilia sonchifolia** DC. in Wight Contrib. (1834) 24.—PLATE 544A.

A glabrous scabrid or puberulous slender herb, 30-40 cm. high, erect or diffuse, variously branched, sometimes decumbent and root-

ing near the base. Leaves very variable; the lower petioled, lyrate or obovate, toothed or entire; the cauline more or less amplexicaul and auricled, usually acute, less commonly obtuse at the apex. Heads few, reaching 1.3 cm. long, laxly corymbose, without bracteoles beneath the head; flowers purplish; peduncles very slender, nodding when young, glabrous. Involucre cylindric, glabrous or puberulous towards the top; bracts almost equalling the corollas, linear-oblong, acute, with scarious margins. Style-arms ½-cylindric; tips conic. Pappus copious, white, soft, nearly equalling the involucral bracts. Achenes 3 mm. long, narrowly oblong, 5-ribbed, brown, scabrid on the ribs.

Distribution: Throughout India, Ceylon.—Most tropical and subtropical regions.

In Malabar, a decoction of the plant is said to be a febrifuge. Mixed with sugar it is given in bowel complaints (Rheede).

In Travancore, pure juice of the leaves is poured drop by drop into the eyes in night-blindness. The natives consider the juice as cooling as rose-water and prescribe it in eye inflammations.

In the Gold Coast, the leaves are mixed with guinea grains and limes and are used to cure sore throat.

In Indo China, a decoction of the leaves is prescribed as an antipyretic.

In La Reunion, the plant is used as an astringent, anti-asthmatic and vulnerary.

Ashanti: Guakuro—; *Bengal:* Sadimodi—; *Bombay:* Sadhimandhi—; *Cawnpore:* Hiranakhuri—; *Central India:* Hiranakhuri—; *Ceylon:* Kadupara—; *Chinese:* Hong Pei Ts'ao—; *Indo China:* Chua le, Chu le, Hen so, Hoa mat loi, La mat gioi, Mat gioi, Mat trang, Reang tuk, Tam toc, Tiet ga—; *La Reunion:* Goutte de sang, Lastron bâtard, Petit lastron—; *Malayalam:* Mulshevi—; *Mundari:* Kulæara, Kulæbasu, Pirimaniara—; *Pampangan:* Tagulinao—; *Sinhalese:* Kadupara—; *Tagalog:* Tagulinao—; *Visayan:* Libun—.

NOTONIA DC.

Fleshy glabrous undershrubs. Leaves alternate, obovate or lanceolate, quite entire or crenulate, fleshy. Heads large, on large

peduncles, subcorymbose, homogamous, discoid, bracteolate or not; flowers all hermaphrodite, fertile, yellow. Involucre cylindric; bracts 1-seriate, equal. Receptacle flat, naked or scarcely fimbrillate. Corollas regular, tubular, slender; limb elongate, cylindric, shortly 5-fid. Anther-bases entire. Style-arms elongate; tips short, ovoid, thick, papillose. Pappus-hairs copious, slender. Achenes glabrous, subterete, 10-striate.—Species 12.—Palæotropics.

The genus is therapeutically inert.

1. **Notonia grandiflora** DC. in Wight Contrib. (1834) 24.—PLATE 545.

A semishrubby glabrous perennial 0.6-1.5 m. high; stems stout, fleshy, not much-branched, marked with the scars of fallen leaves. Leaves 6.3-12.5 by 2.5-7.5 cm., sessile or shortly petioled, obovate or elliptic-lanceolate, quite entire, very fleshy, pale glaucous-green (especially beneath). Heads 2-3.2 cm. long, corymbose, few- or many- flowered, pale yellow; peduncles 10-30 cm. long, stout, glabrous, furnished with a few small scattered leafy bracts. Involucral bracts 1.3-2 cm. long, equal, linear-oblong, acute, striate and with scarious margins. Pappus-hairs copious, longer than the involucre but shorter than the corollas. Achenes 6 mm. long, oblong, 10-striate, glabrous.

Distribution: Konkan, Deccan and W. Ghats of Bombay Presidency, S. Deccan and Carnatic of Madras Presidency.

The plant was brought forward in 1860, by Dr. A. Gibson, as a preventive of hydrophobia. The mode of administration is as follows:—About 4 ounces of the freshly-gathered stems, infused in a pint of cold water for a night, yield in the morning, when subjected to pressure, a quantity of viscid greenish juice, which, being mixed with water, is taken at a draught. In the evenings, a further quantity of the juice, made up into boluses with flour, is taken. These medicines are directed to be repeated for three successive days.

Dr. Waring says that from official documents placed at his disposal, it appears that the remedy has been tried in numerous cases; but as at the time of the infliction of the wound, caustic was applied locally in the majority of cases, it is difficult to determine how for the Notonia operated, if at all, as a prophylactic.

An extract of the herb was tried by the late Dr. Haines and myself on dogs, and afterwards at the European Hospital in Bombay (1864). In one drachm doses it had a feebly aperient action; no other effect was observed (Dymock).

Bombay: Gaidar—; *Marathi:* Wanderroti—; *Telugu:* Kundelucheviyaku—.

Senecio (Tourn.) Linn.

Herbs, shrubs, or undershrubs. Leaves alternate or radical, entire or variously divided. Heads solitary, corymbose or recemose, heterogamous (rarely homogamous), usually yellow; ray-flowers fertile, female, or 0; disk-flowers hermaphrodite, fertile. Involucre various; bracts 1- or sub-2- seriate, equal, erect free or connate at the base, usually keeled or 3-nerved on the back, with sometimes few or several small bracteoles below the involucre. Receptacle flat or convex, naked, pitted or fimbrillate. Corollas of female flowers ligulate, the ligules elongate, spreading, or very small and revolute, or scarcely conspicuous; corollas of hermaphrodite flowers regular, tubular, 5-fid. Anther-bases obtuse, or auricled, or minutely tailed. Style-arms of hermaphrodite flowers recurved; tips truncate, penicillate, rarely rounded or with a short narrow point. Pappus-hairs copious or sparse, soft, usually white, smooth, scabrid or barbellate. Achenes subterete or the outer dorsally compressed, 5-10-ribbed.—Species 1,450.—Cosmopolitan.

A. Heads turbinate or obconic, all radiate, usually bracteolate. Involucral bracts 1-seriate .... 1. *S. tenuifolius.*

B. Perennial herbs with long-petioled, very broad, orbicular, reniform or palmate radical leaves and cauline leaves with large sheaths
   Leaves palmately lobed. Heads corymbose .... 2. *S. jacquemontianus.*

C. Heads few- or many- flowered. Flowers all pappose. Involucral bracts uniseriate
   1. Herbaceous, glabrous or sparsely pubescent. Leaves petioled, membranous, cordate or subreniform and 3-7-angled or palmately lobed .... 3. *S. quinquelobus.*
   2. Shrubby. Heads in axillary and terminal corymbs .... 4. *S. densiflorus.*

The leaves are emollient, vulnerary, sudorific and vermifuge.

The following species are used medicinally in Europe—*S. cineraria* DC., *S. doria* Linn., *S. incanus* Linn., *S. jacobæa* Linn.,

S. viscosus Linn., *S. vulgaris* Linn.—; in China—*S. campestris* DC. *S. nikœnsis* Miq., *S. palmatus* Pall., *S. scandens* Ham.—; in Indo China—*S. kœmpferi* DC., *S. palmatus* Pall., *S. scandens* Ham.—; in North America—*S. aureus* Linn., *S. vulgaris* Linn.—; in Mexico—*S. cervariœfolius* Sch., *S. grayanus* Hemsl.—; in Madagascar—*S. ambavilla* Pers., *S. erechtitoides* Baker, *S. faujasioides* Baker, *S. hildebrantii* Baker, *S. microdontus* Baker—; in Mauritius and La Reunion—*S. ambavilla* Pers.—; in South Africa—*S. albanensis* DC. var. *leiophyllus*, *S. asperulus* DC., *S. brachypodus* DC., *S. bupleuroides* DC., *S. concolor* DC., *S. coronatus* Harv., *S. deltoides* Less., *S. dregeanus* DC. var. *discoideus*, *S. erubescens* DC., *S. gerrardi* Harv., *S. macrocephalus* DC. var. *hirsutissimus*, *S. orbicularis* Sond., *S. othonniflorus* DC., *S. quinquelobus* DC., *S. rhyncholœnus* DC., *S. serra* Sond., *S. serratuloides* DC., *S. serratus* Sond., *S. speciosus* Willd., *S. subcoraceus* Schltr., *S. tamoides* DC., *S. tanacetoides* Sond., *S. vulgaris* Linn.—.

The genus SENECIO is of considerable toxicological importance in South Africa. Various species have from time to time been regarded as causing disease in man and animal.

Two alkaloids, senecifoline and senecifolidine, have been isolated from *S. latifolius* DC.

S. vulgaris Linn. contains an alkaloid, senecionine.

1. **Senecio tenuifolius** Burm. Fl. Ind. (1768) t. 60, fig. 4.—*Doronicum tenuifolium* Wight Ic. t. 1,129.—PLATE 546.

Annual, slender, herbaceous, 15-45 cm. high, usually much-branched, glabrous. Leaves sessile, pinnatifid or sub-2-pinnatifid; segments slender, spreading, obtuse. Heads 6-8 mm. diam., few, in divaricating corymbs, rayed; peduncles slender, glabrous, furnished with a few scattered acute bracts. Involucral bracts 10-13, oblanceolate, subequal, 3-4 mm. long, acute or acuminate, with broad scarious margins and yellowish nerves, glabrous or nearly so. Ligules 6-10. Pappus copious, yellowish, as long as the achenes. Achenes of the ray-flowers usually abortive, elongate, finely pubescent or glabrous, those of the disk-flowers narrowed at the base, 3 mm. long, faintly ribbed, hairy with white hairs on the ribs, brown.

Distribution: S. M. Country, Deccan, Carnatic.—Java.

In Kashmir, the leaves are used as an emollient and vulnerary.

Punjab: Mentog, Nimbar, Sanggye—.

2. **Senecio jacquemontianus** Benth. in Benth. and Hook. f. Gen. Pl. II, 449; Blatter Beautiful Fl. Kashmir I (1927) 175, p. 31, fig. 3.—PLATE 544B.

A robust, hairless, perennial herb. Stems 0.9-1.5 m. high. Leaves 30 cm. broad and less, broadly ovate-cordate or almost halbert-shaped, blunt or sharp-pointed, toothed; stalk of lower leaves 12.5-38 cm. long, stout, winged, wing narrow or broad, gashed or toothed, of stem-leaves sheathing. Heads many, stalked, 3.8-5 cm. across the ligules, forming racemes 10-20 cm. long which become longer in fruit, stalks curved, 2.5-6.3 cm. long, which become longer in fruit, stalks curved, 2.5-6.3 cm. long, lower with oblong leafy bracts at the base. Bracteoles under the heads few, filiform. Bracts immediately surrounding the flower-heads 8-12, oblong, sharp-pointed, 8 mm. long, hairless, bases slightly united. Ligules yellow, 12-15, long and broad, 1.3-2 cm. long, 5-9-nerved, entire or toothed at the tip. Fruit (achene) 8 mm. long, deeply grooved, linear-oblong. Pappus-hairs 1.5 mm. long, unequal, united at the base.

Distribution: Apparently endemic in Kashmir, 8,000—13,000 ft.

The root is used in Kashmir as a nervine tonic.

Kashmir: Hatermul, Poshkar—.

3. **Senecio quinquelobus** Hook. f. and Th. in Hook. f. Fl. Brit. Ind. III, 353.—PLATE 547B.

Herbaceous, glabrous or sparsely pubescent; root perennial; stem simple long slender erect flexuous grooved, 0.6-0.9 m. long, naked below. Leaves petioled, membranous, cordate or subreniform, 3-7-angled, palmately lobed; angles or lobes coarsely sinuate-toothed, and teeth acute and apiculate, 5-10 cm.; sometimes as broad as long or even broader, rather glaucous beneath, uppermost not cordate; petiole slender not auricled. Racemes 30 cm. long and less, very slender, sometimes quite simple with secund bracteate peduncles bearing solitary terminal heads and bulb-like leaf-buds in the axils; or the peduncle becomes an elongated branch bearing many bulbils.

Heads narrow, 5-6-flowered, bracteolate; involucral bracts 5-6, linear, membranous, obtuse or acute, green. Corolla large, tube shorter than the campanulate limb; ligules absent, anthers exserted with very short tails. Achenes 2.5 mm. long, slender, glabrous, shorter than the scanty white pappus; tip dilated.

Distribution: Temperate Himalaya, from Garhwal to Bhutan, 10,000—12,000 ft.

In Kanawar, the seeds are given for colic (Stewart).

Punjab: Morta—.

4. **Senecio densiflorus** Wall. in DC. Prodr. VI, 369.—PLATE 547A.

Shrubby plants. Branches, leaves beneath and corymbs clothed with appressed white, rarely grey, cottony wool. Branches stout. Leaves 12.5-23 by 2.5-9 cm., glabrous or cottony above, narrowly or broadly elliptic, or obovate lanceolate acuminate, toothed, teeth often hooked; petiole 0.6-2.5 cm., with often small, broad-toothed auricles. Heads campanulate, shortly pedunculated, 6 mm., long, many-fid, bracteolate in axillary and terminal branched sub-panicled corymbs. Involucral bracts 8-12, linear, acute, white, tomentose, opaque. Receptacle pitted and bristly; ligules 8-10, very short. Achenes 1.8 mm., glabrous; pappus equalling or shorter than the tubular corollas, white.

Distribution: Central and Eastern Himalaya: From Nepal to Bhutan, 5,000—7,000 ft., Khasia Hills 4,000—6,000 ft.

The leaves are applied to boils as an emollient and maturant.

Punjab: Chitawala—.

OTHONNOPSIS Jaub. & Spach.

Glabrous leafy undershrubs. Leaves alternate, sessile fleshy. Heads peduncled, solitary or panicled on the shortened leafy branches, heterogamous, radiate or disciform, yellow; outer flowers female, 1-seriate, fertile, ligule entire or 3-toothed or 0; disk-flowers hermaphrodite, sterile, tubular, limb 5-fid. Involucre ovoid or campanulate; bracts 1-seriate, oblong, bases subconnate; receptacle flat, naked. Anther-bases entire. Style-arms of hermaphrodite

linear, tip truncate penicillate. Achenes of female oblong, obscurely 5-10-ribbed, pubescent or villous; of hermaphrodite slender, empty, glabrous; pappus hairs of female copious, many-seriate, slender, white; of hermaphrodite scanty.—Species 8.—Africa, W. Asia.

The genus has little medicinal importance.

1. **Othonnopsis intermedia** Boiss. Fl. Or. III, 414.

A shrub 0.3-0.9 m. high with woody erect leafy branches and white bark. Leaves 2.5-6.3 cm., 3-nerved, oblong elliptic or linear-oblong, rarely subspathulate, obtuse or acute, quite entire, coriaceous when dry. Heads numerous, 2-2.5 cm. diam., long-peduncled; peduncles 2.5-7.5 cm. stout, terminal and sublateral, erect, naked, a little swollen below the subterminal base of the involucre. Involucral bracts elliptic or lanceolate, shorter than the yellow ligules, variable in width. Achenes pebescent.

Distribution: Baluchistan, Waziristan.—Afghanistan to Persia.

In the Bolan Pass, the plant is used as a cure for headaches; in Loralai for boils and pimples (Hughes-Buller).

Bolan Pass: Mungli, Munglian—; *Loralai:* Gango—; *Quetta:* Gangu, Manguli—; *Shahrig:* Gangu—; *Zhob:* Gangu—.

Calendula Linn.

Annual or perennial herbs. Leaves alternate, entire or sinuate-toothed. Heads terminal, peduncled, heterogamous, rayed, yellow or orange; ray-flowers female, 1-2-seriate, fertile, ligules entire or 3-toothed; disk-flowers hermaphrodite, sterile, tubular, limb dilated shortly 5-fid. Involucre broad; bracts 1-2-seriate, linear, acuminate, subequal, margin often scarious; receptacle flat, naked. Anther-bases sagittate, auricles acuminate or tailed. Style-arms of hermaphrodite undivided. Achenes glabrous, of the ray incurved, 2-3-seriate, heteromorphous, outermost often empty, the next broader often winged, inner shorter; of the disk-slender, empty; pappus 0.—Species 15.—Mediterranean.

C. officinalis Linn. is used medicinally in Europe and China; *C. arvensis* Linn., *C. suffruticosa* Vahl in Europe.

1. **Calendula officinalis** Linn. Sp. Pl. (1753) 921.

Annual, erect, hispidly pubescent; stem 30-45 cm., corymbosely branched above. Leaves 2.5-7.5 cm., acute, often hispid on both surfaces; lower leaves spathulate quite entire, upper lanceolate base cordate-amplexicaul toothed or subentire. Heads terminal, 5 cm. diam. and under; involucral bracts 6 mm., incurved and appressed to the ripe achenes; ligules many, bright orange yellow, 3-toothed, tube hairy. Achenes longer than the involucre, all curved boat-shaped dorsally muricate not beaked, outer larger ventrally crested, scarcely beaked.

Distribution: Mediterranean.—Introduced in India and run wild.

In Europe, the leaves are considered resolvent and diaphoretic; the flowers are held stimulant, antispasmodic, emmenagogue.

A decoction of the flowers is employed by country people in England as a posset drink in measles and smallpox; and the expressed fresh juice proves a useful remedy against costiveness, as well as for jaundice, and suppression of the monthly flow.

The plant has been considered also of service for scrofulous children, when given to them as a salad.

One of the flowers if rubbed on any part recently stung by a bee or wasp will quickly relieve it.

Druggists now make a medicinal tincture which is advised as a sudorific stimulant in low fevers, and to relieve spasms. A saturated tincture of the flowers, when mixed with water, promotes the cure of contusions, wounds, and simple sores or ulcers; also the extract will allay chronic vomiting. One drop of the tincture with two grains of powdered borax when sprayed into the ear is very useful if a discharge has become established therefrom.

The plant, especially its flowers, was used on a large scale by the American surgeons to treat wounds and injuries sustained during the last civil war, and obtained their warmest commendation. It quite prevented all exhausting suppurative discharges and drainings.

The plant is signally valued for healing wounds, ulcers, burns, and other breaches of the skin surface; it is a precious vulnerary.

Burma: Htattaya—; *Catalan:* Clavellina de mort, Gojato—; *Chinese:* Chin Chan Ts'ao—; *Danish:* Almindelige Kœblomme—; *Dutch:* Afrikaantje goudsblœm, Goudsblœm, Tamme goudelœm—; *English:* African Marigold, Calendula, Common Marigold, Garden Marigold, Marigold, Pot Marigold—; *French:* Souci, Souci cultivé, Souci des jardins—; *German:* Butterblume, Dannblaumen, Dotterblume, Færberblume, Gæhl, Gæhlgœlling, Gartringel, Gelken, Gilkenblume, Gœldeke, Gœlling, Goldblume, Goldrose, Gugelkopf., Hauswirbel, Huehnernelke, Ingblume, Kohlblume, Kolblume, Morgenrœte, Rinderblume, Ringelblume, Ringelken, Ringelrose, Sonnenblume, Sonnenrose, Studentenblume, Totenblume, Wagenblume, Warzenkraut, Wegrœslein, Zunenwirvel—; *Italian:* Calendula, Calendula ortense, Fiorrancio; *Polish:* Nogieter—; *Portuguese:* Calendula ortense, Maravilha bastarda—; *Punjab:* Aklelulmulk, Saladbargh, Zergul—; *Roumanian:* Galbinele, Hilimica—; *Russian:* Nogotki—; *Spanish:* Calendula officinal, Flor del muerto, Maravilla—; *Swedish:* Ringblomma—.

ECHINOPS Linn.

Thistle-like herbs more or less albo-tomentose. Leaves alternate, pinnatifid, spinous. Heads in globose involucrate solitary balls, blue or white, sessile or shortly stipitate on a common receptacle, 1-flowered; flowers hermaphrodite, all fertile. Involucre oblong; bracts many-seriate, rigid, pungent or some spinescent, outer shorter, inner spathulate, innermost linear or lanceolate, sometimes all connate into a tube with 1 rigid spine on the outer side. Receptacle minute. Corolla regular; tube slender; limb cylindric, 5-partite with slender segments. Filaments glabrous; anther-bases sagittate, the auricles connate; tails short, fimbriate or entire. Style-arms thick and with a thick basal ring, at length more or less spreading. Pappus coroniform, of many short subpaleaceous free or more or less connate bristles. Achenes elongate, subterete or 4-gonous, villous (rarely glabrous).—Species 82.—E. Europe, Africa, Asia.

E. dahuricus Fisch. is used medicinally in China.

Turkish Manna is obtained from *E. persicus* Stev.

Three alkaloids—echinopseine, echinopsine, and B-echinopsine—have been isolated from the seeds of *E. ritro* Linn.

1. **Echinops echinatus** Roxb. Hort. Beng. (1814) 62.—PLATE 548.

A much-branched rigid annual 0.3-0.9 m. high; branches widely spreading from the base, white with cottony pubescence. Leaves sessile, 7.5-12.5 cm. long, glabrous or minutely scaberulous (rarely araneously pubescent) above, white with cottony wool beneath, oblong, deeply pinnatifid, the lobes triangular and oblong, sinuate and spinescent, the spines often 2.5 cm. long. Balls of the heads white, 2.5-3.8 cm. (rarely more) diam. (excluding the spines); segments of corolla-limb 5 by 0.85 mm., linear, acute. Involucres surrounded by strong white bristles resembling pappus-hairs; outer involucral bracts oblanceolate, glabrous, pungent; intermediate bracts with 1 or 2 of the bracts often produced into sharp spines sometimes exceeding 2.5 cm. long, causing the balls frequently to bristle with many spines; innermost bracts 5-8, nearly 13 mm. long, connate for more than half their length into a tube round the achenes, the free segments acute, or obtuse and laciniate at the apex, ciliate and with scarious margins. Anther-tails fimbriate. Pappus short, yellowish, forming a short cylindric brush above the achene. Achenes 4 mm. long, obconic, densely villous.

Distribution: More or less throughout India.—Afghanistan.

The plant is pungent, bitter, hot; improves the taste; cures "kapha" and "vata"; used in strangury, biliousness, urinary discharges, gleet, thirst, diseases of the heart.—The root is abortifacient, aphrodisiac.—The seeds are sweet; wholesome, cooling, aphrodisiac (Ayurveda).

The plant is bitter; stomachic, antipyretic, analgesic; increases the appetite; stimulates the liver; useful in diseases of the brain; used in ophthalmia, chronic fever, pains in the joints, inflammations.—The root is aphrodisiac (Yunani).

The drug is bitter, and is considered to be tonic and diuretic.

At Hesargai, the roots are pounded and mixed with Acacia gum and applied to the hair to destroy lice; also the powdered roots are applied to wounds in cattle to destroy maggots (Hughes-Buller).

Arabic: Ashtarkhar—; *Gujerati:* Shuliyo, Utkanto, Utkato—; *Hindi:* Gokhru, Utakanta, Utakatira—; *Marathi:* Kadechubak, Utanti, Utati, Utkatara—; *Ormara:* Gurgaj—; *Persian:* Astarkhar—; *Pushtu:* Chingamwali—; *Sanskrit:* Kantalu, Kantaphala, Karamadana, Mukhadantarujapaha, Raktapushpa, Shrigala, Shunakashana, Tikshnagra, Ushtrakanta, Utati, Utkantaka, Utkatotkata, Vrittaguchha—; *Urdu:* Untkatara—.

Carduus (Tourn.) Linn.

Erect thistles. Leaves alternate, often decurrent, serrate-toothed or pinnatifid, spinescent. Heads solitary and long-peduncled or subsessile, scattered or crowded, homogamous; flowers all hermaphrodite and fertile (rarely dioecious) white, yellow or red, tube slender, limb equal or oblique 5-fid. Involucre ovoid hemispheric or globose; bracts many-seriate, appressed, erect spreading or recurved and spinescent or with a spinescent appendage; receptacle flat or convex, densely bristly. Filaments hairy or glabrous. Anther-bases sagittate, auricles connate, tails slender. Style-arms short, rarely filiform, obtuse. Achenes glabrous, obovoid, obtusely 4-angled, smooth or 5-10-ribbed, truncate or the top umbonate, basal areole nearly straight; pappus copious, hairs many-seriate, rigid, simple or barbellate, deciduous with a basal ring.

C. crispus Linn. is used medicinally in China.

1. **Carduus nutans** Linn. Sp. Pl. (1753) 821.—Plate 549B.

An erect, robust, rough herb; stem 0.3-1.2 m., winged, grooved. Leaves alternate, oblong, 15-30 cm., sessile, continued down the stem in interrupted, spinous wings, pinnately lobed; margins sinuate, spiny. Heads discoid, 2-3.8 cm. diam., ovoid or globose, solitary or clustered, drooping. Involucral bracts many, tips spinous, spreading or reflexed; receptacle flat, densely bristly; flowers crimson; pappus copious, long, rough, united at the base into a ring; corolla-tube long,

deeply 5-lobed. Achenes glabrous, obtusely 4-angled; pappus soon-falling off.

Distribution: W. Himalaya from Kashmir to Simla, 6,000—12,000 ft. W. Asia, N. Africa, Europe.

The medicinal properties are the same as those of *Fagonia arabica* (Yunani).

In the Punjab, the flowers are considered febrifugal. They are used to purify the blood in Kashmir.

English: Bank Thistle, Buck Thistle, Musk Thistle, Queen Anne's Thrissel, Scotch Thistle—; *Kashmir:* Gulibadaward—; *Punjab:* Badaward, Kanchhari, Tiso—; *Urdu:* Gulebadaward—.

SILYBUM Vaill. ex Adans.

An erect glabrous thistle. Leaves alternate, sinuate-lobed, spinescent, marbled with white. Heads large, solitary, terminal, nodding, homogamous; flowers all hermaphrodite, similar and fertile, purple, tube slender, limb dilated below 5-fid. Involucre subglobose; bracts many-seriate, broad and fimbriated with spines below above terminating in a spreading rigid spine, inner lanceolate erect pungent; receptacle flat, densely bristly. Filaments glabrous, united in a sheath below; anther-bases sagittate, auricles connate mucronate or shortly tailed. Style subentire, ring below the hairs not prominent. Achenes glabrous, obovoid-oblong, compressed, basal areole straight; pappus-hairs many-seriate, unequal, subpaleaceous, united at the base in a deciduous ring.—Species 2.—Mediterranean.

S. marianum Gærtn. is used medicinally in Europe.

1. **Silybum marianum** (Linn.) Gærtn. Fruct II (1791) t. 102.—PLATE 549A.

A biennial plant 1-2 m. high, glabrous, pale green; stem simple or slightly branching. Leaves large, mottled with white, pinnatifid into ovate-triangular, sinuate-toothed, spiny lobes. Heads globular 6-10 cm. broad, concave at the base; outer scales of the involucre oblong at the base, broadening into an ovate, prickly ciliate, margined appendage which tapers abruptly into a long, stiff spine; inner scales lanceolate, entire.

Distribution: N.-W. Himalaya, Punjab.—Westwards to N. Africa and Europe.

The leaves are sudorific and aperient. The seeds are demulcent and have been found of special value in hæmorrhages.

Catalan: Cart gallofer, Cart de Maria—; *Dutch:* Mariendistel, Melkdistel, Vrouwendistel—; *English:* Holy Thistle, Lady's Thistle, Milk Thistle—; *French:* Artichaut sauvage, Carthame maculé, Chardon argenté, Chardon lacté, Chardon Marie, Chardon Notre Dame, Chardon tache, Lait de sainte Marie—; *German:* Feedistel, Frauendistel, Froschdistel, Mariendistel, Silberdistel, Wehedistel, Wolldistel—; *Greek:* Silybon—; *Italian:* Cardo del latte, Cardo di Maria, Cardo Mariano—; *Malta:* Blessed-Thistle, Milk Thistle, Cardo mariano, Xeuk baghli—; *Roumanian:* Armurariu—; *Russian:* Ostropestro—; *Spanish:* Cardo lechal, Cardo lechero, Cardo de Maria—; *Swedish:* Sempertin—.

SAUSSUREA DC.

Annual, biennial or perennial, glabrous or tomentose herbs of various habit. Leaves unarmed, alternate, entire toothed pinnatifid or pinnatisect. Heads narrow or broad, sometimes crowded on the dilated top of a simple stem, peduncled or sessile, solitary corymbose or panicled, homogamous; flowers purple or bluish, all hermaphrodite and similar, tube slender, limb narrow 5-fid. Involucre ovoid oblong globose or hemispheric; bracts many-seriate, appressed, not spinescent, inner longer narrower; receptacle flat or convex, densely bristly, rarely naked. Filaments free, glabrous; anther-bases sagittate, auricles connate, tails usually long entire ciliate or wooly. Style-arms linear. Achenes glabrous, oblong, 4-ribbed, smooth or rugose; top truncate and cupular, or crowned with a thickened disk and the persistent base of the style; basal areole straight; pappus-hairs 1-2-seriate, inner feathery, base thickened and connate into a deciduous ring, outer usually of rigid scabrid bristles rarely feathery or 0.—Species 125.—N. temperate regions.

A. Glabrous, woolly or cottony, rarely villous herbs. Stems simple, leafy .... 1. *S. obvallata.*

B. Stems tall, leafy, simple below, corymbosely branched above. Leaves all cauline or radical and cauline

   I. Leaves lyrate-pinnatifid, cottony beneath. Heads broad, erect or sub-erect

1. Inflorescence glabrous .... 5. *S. affinis.*
2. Inflorescence cottony .... 2. *S. candicans.*

II. Leaves lyrate-pinnatifid, glabrous above, cottony or white beneath .... 3. *S. hypoleuca.*

C. Tall, very stout herbs. Stem 1.2-3 m. long, simple below .... 4. *S. lappa.*

S. hypoleuca Spreng. is used medicinally in Indo China, *S. lappa* C. B. Clarke in China.

1. **Saussurea obvallata** Wall. Cat. (sub no. 2,906).—PLATE 550B.

Stem stout, simple, 15-45 cm., slightly hairy or almost hairless, ended by the bent-in, bladdery, veined, translucent leaves which form a pale head 7.5-15 cm. diam., enclosing 2-6 flower-heads. Leaves 10-20 cm., hairless, blunt, toothed, lower ones stalked, inversely ovate, stem-leaves stalkless, half-stem-clasping, oblong, concave. Flower-heads stalkless or short-stalked, hairless, 1.3-2 cm. diam., hemispheric. Bracts surrounding the heads lanceolate, tip and often the margin black. Corolla 6 mm. long. Anther-tails short, fringed. Pappus brown, 8 mm. long, outer pappus-bristles rough or absent. Fruit (achene) inversely ovate, ribbed, hairless.

Distribution: Himalaya, from Kashmir to Sikkim, 10,000—15,000 ft., Altai Mountains.

The root is applied to cuts and bruises.

North-Western Himalaya: Bergandutongur—; *Punjab:* Birmkanwal, Kanwal—.

2. **Saussurea candicans** Clarke Comp. Ind. 232.—PLATE 551A.

Stems 0.3-1.5 m. high, erect, cottony. Basal leaves oblong or inversely ovate, narrowed into a short stalk, 0.4 by 1.3-3.8 cm., sometimes 45 by 12.5 cm., entire or sinuate, pinnately lobed near the base, rough above, white-hairy below. Stem-leaves usually few, stalkless, lanceolate,, usually smaller than the basal leaves. Heads 2-3.8 cm. diam., long-stalked, solitary or in corymbs. Bracts surrounding the heads lanceolate, long-pointed, rigid, hairy. Corolla pale red, up to 1.3 cm. long. Anther-tails fringed. Pappus-hairs slender, white, as long as the corolla. Outer pappus none. Fruit (achene) 5 mm. long, 5-angled, pointed all over, top cupular.

Distribution: From the Salt Range, Hazara and Kashmir to Bhutan, 2,000—7,000 ft. —Afghanistan.

The seeds are carminative. They are used for horses in the Punjab.

In the Pab Hills in Jhalawan, the seeds are considered as a cure for horse-bite (Hughes-Buller).

Pab Hills: Kareji—; *Punjab:* Batula, Kaliziri—.

3. **Saussurea hypoleuca** Spreng. in DC. Prodr. VI., 541.—PLATE 550A.

Stem 0.6-1.5 m. high, erect, simple or branched above, leafy, hairy or hairless. Basal leaves narrow, 16-25 cm. long, pinnately cut, lateral lobes pointing downwards, end-lobe much larger, oblong. Stem-leaves 7.5-20 cm. long, pinnately lobed, lateral lobes 2-4 pairs, oblong, less than 2.5 cm. long, end-lobe triangular, sharp-pointed, 5-10 by 2.5-7.5 cm., toothed or sinuated; rough above, white-hairy beneath. Flower-heads 3.8-5 cm. diam., solitary, globose, nodding, long-stalked, many-flowered. Bracts surrounding the heads lanceolate, long-pointed, purple. Corolla dark purple, 8 mm. long, limb the length of the tube. Anther-tails long, entire or split near the tip. Fruit (achene) 4 mm. long, almost cubical, 4-angled, tubercled, black, tip with a toothed cup. Pappus 8 mm. long, brown, single.

Distribution: From Kashmir to Sikkim, 7,000—13,000 ft.

The leaves are considered as purgative and antisyphilitic in Indo China.

Annam: Moc huong—; *Indo China:* Mu hsiang—.

4. **Saussurea lappa** Clarke Comp. Ind. 233; Blatter Beautiful Fl. Kashmir I (1927) 185, pl. 33, fig. 1.—PLATE 551B.

A tall, robust, perennial herb. Stem erect, 1.2-2 m. high, simple. Leaves membranous, irregularly toothed; basal ones very large, 0.6-1.2 m. long, triangular, with a long lobately winged stalk, end-lobe often 30 cm. diam. Stem-leaves smaller, stalked or stalkless, with 2 half-stem-clasping lobes at the base. Flower-heads stalkless, hard, rounded, 2.5-3.8 cm. diam., 2-5 forming axillary and terminal clusters. Bracts surrounding the heads many, ovate-lanceolate, long-pointed, rigid, bent back, hairless. Corolla 2 cm. long, tubular, dark blue-purple or almost black. Stamens free. Anther-tails fringed.

Pappus-hairs 1.7 cm. long, brown, all feathery. Fruit (achene) up to 8 mm. long, compressed, curved, tip narrowed, with 1 rib on each face, top contracted, cupped.

Distribution: Kashmir, 8,000—12,000 ft.

The root is hot, bitter, sweetish, pungent; fattening, aphrodisiac, alterative; improves the complexion; cures leucoderma, erysipelas, itching, ringworm, "tridosha", diseases of the blood, bronchitis, vomiting, scabies, "vata", used in epilepsy, headache, hysteria (Ayurveda).

The root is of two kinds : sweet and bitter; alexipharmic, carminative, analgesic, anthelmintic, emmenagogue, aphrodisiac, tonic; stimulates the brain; cures diseases of the blood, the liver and the kidney; cures headache, deafness, pain in the chest and in the joints, paralysis, asthma, cough, inflammations, ophthalmia, old fevers (Yunani).

The root is prescribed as a stomachic and tonic, and in the advanced stage of typhous fever. In the Punjab, applied in powder, to ulcers, for worms in wounds, and also in rheumatism; also considered depurative and aphrodisiac (Murray).

The root and stem are prescribed in snake-bite (Charaka, Sushruta, Vagbhata, Bhavaprakasha, Yogaratnakara, Rasaratnakara, Sharangdharasamhita) and scorpion-sting (Charaka, Sushruta, Vagbhata, Brihannighantaratnakara, Rasaratnakara, Yogaratnakara, Nighantaratnakara, Vaidyavinoda).

In snake-bite, the root is given internally in powder form or in the form of a decoction (Roberts).

The root and stem are not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

As a medicine the root is considered carminative and stimulant in China.

Chopra and De (*Ind. Journ. Med. Research;* October, 1929) thus summarise their work :

(1) *Saussurea lappa* or *kut* root grows on the moist slopes of the Northern Himalayas at a height of 8,000 to 13,000 ft. above the sea-level.

(2) The chief active constituents of the root are :
  (*i*) An essential oil 1.5 per cent,
  (*ii*) an alkaloid which has been named *saussurine* 0.05 per cent,
  (*iii*) Resin 6.0 per cent. Besides these, there occur a fixed oil, traces of a bitter substance, small quantities of tannins, inulin, potassium nitrate, sugars, etc.

The leaves contain no essential oil but 0.025 per cent of the alkaloid *saussurine.*

(3) The essential oil has a strong aromatic, penetrating and fragrant odour. It has antiseptic and disinfectant properties; it relaxes the involuntary muscle tissue; it is a cardiac stimulant, a carminative, an expectorant and a diuretic.

(4) The alkaloid *saussurine* has a depressant action on the vagus centre in the medulla as well as on the involuntary muscle fibres of the bronchioles and gastro-intestinal tract. It produces a slight but persistent rise of blood-pressure and increases the force of contraction and amplitude of the ventricles.

(5) The drug has a remarkable effect in controlling attacks of bronchial asthma, especially those of the vagotonic type. The paroxysms are cut short by the combined action of the essential oil and the alkaloid present in the root. The essential oil during its excretion in the lungs not only relaxes the bronchial muscle but has a marked expectorant action which relieves turgescence of the mucosa. It may be pointed out, however, that although the drug relieves asthmatic attacks, it does not produce permanent cure unless the casual factors are investigated and removed.

The drug is also useful in persistent hiccough.

(6) The drug has no anthelmintic action, nor has it any action against malaria, leprosy and rheumatism as has been claimed by writers of the indigenous system in this country.

Arabic: Kust, Kustabeheri, Kustullhalu—; *Bengal:* Kur, Pachak—; *Bhote:* Rusta—; *Bombay:* Ouplate—; *Canton:* Muk heung—; *English:* Costus—; *Gujerati:* Kut, Upaleta—; *Hindi:* Kot, Kur, Kust, Kut, Pachak—; *Kashmir:* Postkhai—; *Malaya:* Mook heong, Mu hsiang—; *Malayalam:* Sepuddy—; *Persian:* Koshnaha, Kust, Kutshirin, Kuttalkh—; *Punjab:* Kot, Kust, Kut, Kuth—; *Sanskrit:* Agada, Amaya, Apya, Bhasura, Dushta, Gada, Gadakhya, Gadavha, Gadavhaya, Haribhadraka, Jarana, Kadakhya, Kakala, Kashmirja, Kaubera, Kinjalka, Kushtha, Kuthika, Kutsita, Niruja, Padmaka, Pakala, Pakalam, Paribhadraka, Paribhavya, Pavana, Rama, Roga, Rogavhaya, Ruja, Ruk, Utpala, Vaniraja, Vyadhi, Vyapya—; *Sinhalese:* Godamahanel—; *Tamil:* Goshtam, Kostum, Putchuk—; *Telugu:* Changala, Kustam—; *Urdu:* Kut—.

5. **Saussurea affinis** Spreng. in DC. Prodr. VI, 540.

Annual. Stem 0.6-2.4 m. high and often very thick, grooved, glabrous or nearly so. Leaves lyrate-pinnatifid, white-cottony beneath; radical petioled, 10-20 cm. long, membranous, glabrous or puberulous above; cauline sessile, uppermost sinuate-lobed or entire. Heads broad, on long grooved peduncles, arranged in large open panicled corymbs, 2.5 cm. diam. Involucral bracts glabrate, 5-nerved; outer ovate, obtuse or acute; inner lanceolate, acuminate often tinged with purple. Corolla 8 mm. long, very slender, pale red. Anther-tails short, fimbriate. Achenes 2 mm. obovoid, smooth, 10-ribbed, tip contracted. Pappus-hairs 8 mm., very slender, white, outer 0.

Distribution: Bengal, from Sylhet to the foot of the Nepal Hills, Burma.—China, Japan, E. Australia.

In Assam, the juice of the root is given with other medicines for diseases of women (Carter).

Assam: Gangamula—.

JURINEA Cass.

Annual or perennial herbs. Leaves entire toothed or pinnatifid, rarely armed, more or less tomentose. Heads homogamous; flowers all hermaphrodite, similar, purple; tube slender, limb elongate 5-fid

to the middle or lower. Involucral bracts many-seriate, imbricate, innermost narrow erect, outer shorter; receptacle flat, densely bristly. Filaments free, glabrous; anther-bases sagittate, auricles usually connate, tails elongate. Style-arms short. Achenes glabrous, 4-5 angled, rarely compressed, smooth or 1-3-ribbed between the angles, basal areole nearly straight; pappus-hairs many-seriate, very unequal, rigid, simple barbellate or feathery, persistent or deciduous.—Species 50.—Mediterranean, Europe, Asia.

Therapeutically the genus is of little value.

1. **Jurinea macrocephala** Benth in Benth. and Hook. Gen. Pl. II, 474.—Plate 552.

Stemless. Root woody, perennial. Leaves spreading, 15-45 by 3.8-18 cm., oblong-lanceolate, pinnate or pinnatifid, denticulate, cobwebby or cottony above, thickly white tomentose beneath; long or short-petioled, lobes or segments contiguous, broad, sometimes crisped, teeth acute or mucronate. Heads 3-30, 1.7-2.5 cm. diam., sessile or shortly peduncled. Peduncles stout, tomentose, often cottony at the base. Involucral bracts 2-3.8 cm., scabrid or smooth, erect, scarious; outer involucral bracts ovate-lanceolate; inner elliptic-lanceolate, long-acuminate. Receptacular bristles very rigid, much shorter than the achenes, united into laciniate cups. Anther-tails lacerate. Corolla 2.5-3.2 cm. Achenes large, cuneate-obovate, unequally 4-5-angled, tubercled, 6-8 mm., curved, compressed, truncate, ashy grey. Pappus copious, 2.5 cm. long, brown, hairs cohering at base.

Distribution: Kashmir to Kumaon, 11,000—14,000 ft.

The bruised root is applied to eruptions, and a decoction is given in colic. It is also considered cordial and given in puerperal fever (Stewart).

Kashmir: Dhup—; *Punjab:* Dhup, Dhupa, Gugal, Zhangar—.

Tricholepis DC.

Annual or perennial branched unarmed herbs. Leaves alternate, entire, toothed or the lower sublyrate, often punctate. Heads

terminal, solitary, pedunculate, homogamous; flowers all hermaphrodite, fertile. Involucre ovoid or broad; bracts many-seriate, imbricate, narrow, the exterior gradually shorter, all aristate-acuminate or the outer mucronate. Receptacle flat or convex, densely bristly. Corollas yellow, red, or purple, regular or slightly oblique; tube slender; limb deeply 5-fid. Filaments papillose; anther-bases sagittate, with connate auricles; tails slender, lacerate. Style-arms usually slender, elongate. Pappus-bristles many-seriate, very unequal, serrulate, barbellate, or plumose, long and slender, or sometimes short and paleaceous (rarely 0). Achenes glabrous, with a very oblique or lateral areole, oblong or obovoid, smooth, faintly ribbed.—Species 12.—Indo-Malayan.

The genus is therapeutically inert.

1. **Tricholepsis glaberrima** DC. Prodr. VI (1837) 564.—Plate 553.

Quite glabrous; stem erect, slender, and as well as the branches angled and ribbed. Leaves sessile, 2.5-6.3 cm. by 3-6 mm., linear-oblong or lanceolate, acute, entire, spinous-toothed or spinous-serrate, punctate, base of the cauline leaves not or rarely auricled; midrib and nerves very prominent beneath. Heads 6-8 mm. long, ovoid, glabrous. Corollas 1.25-1.4 cm. long, purple. Involucral bracts linear-lanceolate, aristate-acuminate, ciliolate, sub-erect or slightly recurved. Style-arms slender, with a ring of hairs at the base of the lobes. Paleæ of the receptacle reaching much above the pappus, narrowly linear, acute. Pappus shorter than the achenes, copious, yellowish brown, rigid, subpaleaceous. Achenes oblong, faintly ribbed.

Distribution: W. Rajputana, Mt. Abu, Central India, Konkan, Deccan, S. M. Country, W. Ghats in the Bombay Presidency, S. Kanara, Coorg and the hills of Mysore.

The plant is hot and bitter; cures "kapha", "vata", inflammations; used in leucoderma and skin diseases (Ayurveda).

It is believed to be a nervine tonic and an aphrodisiac, and it is used in seminal debility (S. Arjun).

Bengal: Chhagaladandi, Vamanadandi—; *Bombay:* Motabor—; *Canarese:* Brahmadandi—; *Gujerati:* Brahmadandi, Phusiarun,

Talakanto—; *Hindi:* Brahmadandi—; *Marathi:* Brahmadandi, Motachor—; *Sanskrit:* Ajadandi, Brahmadandi, Kantapatraphala—.

VOLUTARELLA Cass.

Erect or divaricately diffuse annuals. Leaves alternate, toothed or remotely pinnatifid. Heads heterogamous; outer flowers 1-seriate, neuter; disk-flowers hermaphrodite, fertile. Involucre ovoid or globose; bracts many-seriate, imbricate, the innermost narrow, acute, sometimes coloured, erect, the exterior gradually shorter, acute mucronate, or terminated by an awn or a simple spreading spine. Receptacle flat, densely bristly. Corollas regular, purple, violet, or blue; tube slender; limb cylindric, deeply 5-fid. Filaments glabrous or hairy; anther-bases sagittate, the auricles connate, shortly tailed. Style filiform, the arms free or connate. Pappus more or less paleaceous, many-seriate, the innermost 2-4, dilated and flattened, the outer gradually shorter. Achenes obovoid or oblong, subterete or angled, prominently and regularly 5-15-ribbed, the areole oblique or lateral.—Species 5.—Mediterranean to India.

The genus is therapeutically inert.

1. **Volutarella divaricata** C. B. Clarke Comp. Ind. (1876) 240.—PLATE 554.

Stem erect, dichotomously branched, glabrous or scaberulous; branches 0.3-0.6 m. long, angled, smooth or scabrid. Leaves oblong or obovate, entire, toothed or pinnatifid with mucronulate lobes, often undulate or crisped, glabrous or pubescent. Heads ovoid-oblong, 1.3-2.5 cm. long by 6-13 mm. diam., araneously pubescent; peduncles grooved, glabrous or puberulous, with a few small foliaceous bracts. Involucral bracts elliptic-oblong with a long spreading or recurved spinescent awn. Corollas 1.3-2 cm. long, purple; lobes 3 mm. long by about 0.85 mm. wide, linear, acute, very tender. Anther-tails connate to the tips, with a membrane between them in front of the minutely pubescent filaments. Style-arms long, slender, recurved. Paleæ of the receptacle short, about equalling or shorter than achenes. Pappus of many unequal hairs, silvery brown, the innermost flattened

and long. Achenes 5 mm. long, acutely angled, and, in the ripe fruit, punctate between the angles, areole small, the top broad, truncate.

Distribution: Central, W. and S. India, Baluchistan, Punjab Plain.—Afghanistan.

The plant is tonic and laxative; cures old fevers; drives snakes away (Yunani).

The plant is credited with tonic, aperient and deobstruent properties. It is slightly mucilaginous and used in coughs. It is also used as a febrifuge, and often prescribed in fevers and general debility.

Arabic: Shaukatelbaida—; *Bombay:* Badaward—; *Gujerati:* Badaward, Bhonyadandi—; *Hindi:* Badavard—; *Marathi:* Sakayi, Sukayi—; *Persian:* Asfarebari, Badavard, Kangaresufid—; *Syria:* Sanskhurda—; *Turkish:* Lufiniki—; *Urdu:* Badavarda—.

CENTAUREA Linn.

Herbs, often rigid. Leaves radical and alternate, entire toothed or pinnatifid. Heads solitary corymbose or panicled, heterogamous (rarely homogamous), purple, violet, blue, white or yellow; outer-flowers 1-seriate, neuter; disk-flowers female, fertile, tube slender, limb straight or oblique 5-fid to the middle or lower, of neuter flowers often larger with a spreading limb. Involucre ovoid or globose; bracts many-seriate, imbricate, appressed, margins scarious or coriaceous, or ending in a simple or palmately divided spine or a pectinate appendage; receptacle flat, densely bristly. Anther-bases sagittate; auricles connate, tails long or short entire or lacerate. Style-arms with a thickened hairy basal ring, erect and connate or shortly spreading. Achenes oblong or obovoid, compressed or obtusely 4-angled, often shining, basal areole oblique or lateral; pappus very various, bristles rigid or paleaceous, many-seriate, entire serrulate bearded or feathery, rarely 0.—Species 600.—Chiefly Mediterranean.

The flower heads of *C. benedicta Linn.* (*Cnicus benedicta* Gærtn.) are official in Portugal.

1. **Centaurea picris** Pall. in Willd. III, 2,302.

Floccose-tomentose or scabrid-canescent or pale green herb. Root creeping; stems several, erect, virgate, branching almost from the base, corymbose, branches elongate one-headed, often leafy, lower leaves sessile, oblong, or linear-lanceolate, acute or less often obtuse, variously dentate, pinnatifid or pinnatipartite; the upper ones getting smaller, entire. Heads mediocre, ovate, uppermost leaves minute, often bracteate, leaves of involucre ovate-rotund and oblong, herbaceous, cucullate with hyaline tomentose membrane. Flowers rose.

Distribution: Sind, Baluchistan.—Afghanistan, Orient, Central and S. Russia, Siberia, Altai Mountains.

At Wad in Jhalawan, the plant is used pounded in water to cure worms; in Loralai, it is a cure for wounds of sheep, used if wolves tear them (Hughes-Buller).

Harboi Hills: Tulkha—; *Loralai:* Kurakh—; *Wad:* Talkhakao—.

CARTHAMUS (Tourn.) Linn.

Thistle-like herbs. Leaves alternate, rigid, spinescent. Heads usually homogamous; flowers all hermaphrodite, fertile (rarely a few marginal female or neuter) and similar, yellow white or purplish, tube slender; limb oblong, dilated at the base, 5-cleft (or 0 in female flowers). Involucre ovoid or subglobose; bracts many-seriate, inner dry entire or with a short fimbriate appendage, outer with a foliaceous toothed or spinescent appendage (sometimes absent in cultivated specimens); receptacle flat, densely bristly. Filaments usually hairy in the middle; anther-bases sagittate, auricles connate, tails short fimbriate. Style-arms short or long. Achenes glabrous, obovoid, 4-angled or compressed, basal areole oblique or lateral, all or the outer only without pappus, or all or the inner only with paleaceous many-seriate pappus.—Species 25.—Mediterranean, Africa, Asia.

1. Leaves entire and unarmed or spinulose-serrate .... 1. *C. tinctorius.*
2. Leaves oblong or oblong-lanceolate; lower shortly spinulose-toothed, upper half-amplexicaul, very spinous .... 2. *C. oxyacantha.*

C. tinctorius Linn. is used medicinally in Europe, China, Indo China, Malaya, the Philippine Islands and North America.

1. **Carthamus tinctorius** Linn. Sp. Pl. (1753) 830.—Plate 555.

An erect branching herb 0.3-0.6 m. high with broad-lanceolate, spinosely serrate (rarely unarmed) suberect oblong sessile leaves and large terminal heads 2.5-3.3 cm. long of orange-red flowers. Outer involucral bracts large foliaceous ovate-oblong 2.5-3.8 cm. long constricted above the base, green, usually spinous, inner ovate-oblong or lanceolate acute. Cypsele obovoid 4-angled truncate with 4 bosses at the top.

Distribution: Native country not known for certain. Cultivated throughout a large part of India.

The flowers have flavour—; laxative; cure "vata," "tridosha," "kapha", strangury, leprosy; cause biliousness.—The seeds are sweet, acrid, oleagenous; cooling, aphrodisiac; cure "kapha", "vata", leprosy.—The oil from the seeds is indigestible, heating; causes burning sensation; increases "tridosha", depilatory.—The leaves are sweet, hot, pungent; laxative, diuretic, appetiser; cure "kapha", urinary discharges good for the eyes; cause biliousness and anal troubles (Ayurveda).

The flowers have a bitter bad taste and a bad odour; tonic to the liver, hypnotic, diuretic, expectorant; cure inflammations, boils, ringworm, scabies, leucoderma, piles, bronchitis; improve the complexion.—The seeds are bitter; purgative, carminative, bechic, aphrodisiac; good for old people; cure leucoderma, scabies, catarrh, pain in the chest and the throat; enrich the blood; give lustre to the eye.—The oil from the seeds is sweetish; good in all diseases; tonic, strengthening, purgative, carminative, aphrodisiac, bechic; cures pain in the liver and the joints (Yunani).

Although chiefly used as a pigment the flowers have stimulant, sedative, and emmenagogue properties, and are supposed to affect the heart and the liver and prevent the formation of white corpuscles in the blood.

In large doses, *Carthamus* is said to be a laxative; and, administered in warm infusion, diaphoretic. It is used as a substitute for saffron in measles, scarlatina, and other exanthematous diseases to promote the eruptions.

The powedered seeds made into a poultice are used to allay inflammation of the womb after childbirth. The oil is used as a liniment in rheumatism.

The oil is used as a dressing for bad ulcers. It is considered a mild purgative in Sind. In the Punjab, the seeds are considered to be diuretic and tonic. In Sind, they are employed as a cooling medicine; they are sometimes boiled and made into a gruel.

In Bengal (Dumraon), the oil is considered by the ryots as a valuable remedy for itch. A cure is said to be effected after 3 to 6 applications. The young green plant is said to be very efficacious in colds. It is believed to keep the system warm. The charred oil is used for healing sores and for rheumatism. As a veterinary medicine the oil occasionally finds use in healing sores on cattle.

In Indo China, the seeds are considered purgative; the flowers are given in dysmenorrhœa and paralysis as a tonic and emmenagogue.

In the Philippine Islands, the flowers are given as a cure for jaundice.

A decoction (1 in 20) of the powdered seeds was administered to cases of constipation. The action was very mild and in the majority of cases it did not produce the desired effect (Koman).

Safflower, in combination with other drugs, is prescribed for scorpion-sting (Sushruta, Bhaishajyaratnavali, Chakradatta); but it is not an antidote to scorpion-venom (Caius and Mhaskar).

The oil from the seeds and fruit has been examined chemically (*Agricultural Ledger*; 1911-12).

Arabic: Akhariza, Bazrelabris, Habulasfar, Hariz, Kirtum, Kurtum, Usfar—; *Bengal:* Kajirah, Kusamphul, Kusum—; *Bombay:* Kardai, Kusumba—; *Burma:* Heboo, Hshu, Su, Suban, Supan—; *Canarese:* Kusambe, Kusumba—; *Catalan:* Safra bort safrano—; *Chinese:* Hong Hoa, Hong Lang Hoa, Hung Lan Hua—; *Cutch:* Kusumba—; *Dutch:* Basterd Saffraan, Wilde Saffraan—; *Egypt:* Kurtim—; *English:* African Saffron, American Saffron, Bastard Saffron, Dyer's Saffron, Safflower, Wild Saffron—; *French:* Carthame, Cnigue, Safran bâtard, Safran d'Allemagne, Safranon, Carthame des teinturiers, Safran faux—; *German:* Gartensafran, Falschesafran,

Farberdistel, Safflor, Wildersafran—; *Greek:* Knikos—; *Gujerati:* Karada, Kusumbo—; *Hindi:* Barre, Karrah, Kasumba, Kussum—; *Indo China:* Daccam, Hong hoa, Hong lam hoa, Rum—; *Italian:* Cartamo, Croco ortense, Zafferano saracinesco, Zaffrone—; *Konkani:* Kusbo—; *Languedoc:* Grano de perrouguet—; *Malaya:* Hong fah, Hsi hung hua, Hung hua, Hung lan hua, Sai hong fah—; *Malayalam:* Chendurakam—; *Malta:* Bastard Saffron, Zafferanone, Ghosfor—; *Manipur:* Galapmachu—; *Marathi:* Kadaya, Kararhi, Kardai, Kasdi, Kurdi, Sadhi—; *North-Western Provinces:* Barre, Kar—; *Pampangan:* Cachumba, Casubha, Castumba—; *Persian:* Gulekafshah, Gulemaskar, Kasakdanah, Kazhirah, Muasfir—; *Philippines:* Azafran de la tierra—; *Portuguese:* Acafrao, Cartamo—; *Punjab:* Kar Karar, Kurtam, Kusam, Kushumbha, Ma, Safir—; *Rajputana:* Bundi—; *Roumanian:* Brandusa de tvamna—; *Russian:* Saflor—; *Sanskrit:* Agnishikha, Gramyakunkuma, Kamalottara, Kamlottama, Kukkutashikha, Kusumbha, Lohita, Maharajana, Padmottara, Papaka, Pita, Rakta, Vanishikha, Vasraranjana—; *Sind:* Khoinbo—; *Spanish:* Alazor, Azafran bastardo, Azafran romi—; *Swedish:* Saffler—; *Tagalog:* Biri, Casabha, Casubha, Castumba, Catsumba, Lago—; *Tamil:* Chendurukam, Kusumba, Sendurgam—; *Telugu:* Agnisikha, Kushumba, Kusumbha—; *Urdu:* Karha, Kusum—; *Visayan:* Casabha—.

1. **Carthamus oxyacantha** Bieb. Fl. Taur. Cauc. II, 283.

Puberulous, stem and branches white. Leaves oblong or oblong-lanceolate, lower shortly spinulose-toothed, upper half-amplexicaul very spinous. Outer involucral bracts exceeding the head white below the contracted portion green above it with yellow spines. Flowers orange yellow. Achenes obovoid 4-angled smooth shining truncate at the top with 4 bosses, pappus 0.

Distribution: Punjab, Baluchistan.—Afghanistan, westwards to the Caucasus.

The oil extracted from the seeds is used medicinally in the Punjab (Stewart).

Hindi: Kantiari, Karar, Kharara, Poli, Polian—.

Dicoma Cass.

Herbs or low shrubs. Leaves alternate. Heads subsessile on the branches or in the axils of the upper leaves, or leaf-opposed, rarely

corymbose, homogamous, discoid, all the flowers hermaphrodite; or heterogamous, the outer flowers being female, all fertile or the innermost sterile. Involucre globose, conic or subcampanulate; bracts many-seriate, imbricate, ovate, lanceolate or linear, acuminate, spinescent or mucronate or with a long apical spine, the outer bracts gradually shorter. Receptacle flat, naked, often pitted. Corollas of hermaphrodite flowers tubular, the limb enlarged, 5-partite, with erect or revolute lobes; corollas of female flowers, if present slender, subligulate. Anther-bases sagittate; tails long, more or less bearded. Style-arms short, erect, obtuse. Pappus-hairs many-seriate, the inner or all flat, barbellate or feathery, the outer shorter, paleaceous or of slender bristles. Achenes turbinate, densely silky-villous, 5-10-ribbed. —Species 30.—Africa, Madagascar, tropical Asia.

D. tomentosa Cass. is used medicinally in Western Africa; *D. anomala* Sond., *D. capensis* Less., *D. speciosa* E. Mey., *D. zeyheri* Sond. are used in South Africa.

1. **Dicoma tomentosa** Cass. in Bull. Soc. Philom. (1818) 47.—Plate 556.

Annual, erect, much-branched, 15-45 cm. high; stem woody at the base and as well as the branches terete, clothed with white cottony wool, the older branches often tinged with purple. Leaves sessile, 2.5-6.3 cm. by 3-10 mm., linear or linear-obovate, obtuse or subacute, apiculate, entire, clothed on both sides with cottony wool. Heads numerous, campanulate, subsessile or shortly peduncled, solitary, axillary, leaf-opposed and terminal. Corolla white or pale-yellow, 6 mm. long; segments of the limb 4 mm. long. Involucral bracts 1.3-1.7 cm. long, linear-lanceolate, membranous, glabrous, terminated by a long spine. Pappus longer than the achenes, the outer bristles slender, slightly shorter than the inner, the inner 1.3 cm. long, paleaceous, lanceolate-subulate, strongly nerved and with a rigid midrib. Achenes 3 mm. long, 2 mm. broad, turbinate, truncate at the top, densely clothed with long silky-hairs.

Distribution: N.-W. India, Punjab, Sind, Gujarat, Deccan, S. M. Country, Carnatic, Nilgiris, Coimbatore. Mysore.

The herb is strongly bitter, and is used in the neighbourhood of Belgaum as a febrifuge, especially in the febrile attacks to which women are subject after childbirth.

In Hausa and Nigeria, the herb is used as a local application to putrescent wounds.

Belgaum: Navananjichapala—; *Gujerati:* Gholoharnacharo—; *Hausa:* Dauda, Farin dayi, Kwardauda—.

Cichorium (Tourn.) Linn.

Erect, glabrous or hispid herbs with divaricate sometimes spinescent branches. Leaves, upper subentire, lower pinnatifid. Heads sessile on the branches or on thickened peduncles, homogamous, blue; flowers all ligulate. Involucral bracts, inner 1-seriate, at length concave at the base with the outer flowers in the concavity, outer few shorter; receptacle flat, naked or subfimbrillate. Achenes glabrous, sub-5-angled, or the outer subcompressed and many-ribbed or striate, base contracted, tip truncate or the margin slightly produced; pappus pales short, 2-3-seriate.—Species 8.—Mediterranean, Europe, N. Asia.

1. Perennial .... 1. *C. intybus.*
2. Supposed to be a cultivated form of *intybus.* Differs from this species by the stem-leaves which are hastate at the base and smaller .... 2. *C. endivia.*
3. Annual .... 3. *C. noeanum.*

C. intybus Linn. is used medicinally in Europe and California.

Official:—The root of *C. Endivia* Linn. (*C. Endivia* var. *sativa* Willd.) and *C. Intybus* Linn. (*C. sylvestre* G. Bauch.) in Portugal.

The root and leaves of *C. intybus* Linn. in France.

1. **Cichorium intybus** Linn. Sp. Pl. (1753) 813.—Plate 557.

An erect, usually rough and more or less glandular, perennial herb; juice milky; stems 0.3-0.9 m., angled or grooved; branches tough, rigid, spreading. Radical and lower leaves 7.5-15 cm., pinnatifid, lobes toothed, pointing downwards; upper leaves alternate, small, entire. Heads ligulate, 2.5-3.8 cm. diam., terminal and

solitary or axillary and clustered, sessile or on short, thick stalks. Involucre of about 8 inner bracts and a few outer smaller ones, all leaf-like with concave bases; receptacle flat, usually bristly; flowers bright blue; pappus of 1 or 2 series of short, blunt erect scales; ligules very long, spreading, 5-toothed; style-arms long. Achenes smooth, angled, crowned with the ring of pappus scales.

Distribution: N.-W. India up to 6,000 ft., Waziristan, Baluchistan, W. Asia, Europe.

1. *Cultivated-sweet-variety* :—The plant is a good tonic; cooling; useful in thirst, headache, ophthalmia, throat inflammation, enlargement of the spleen, fever, vomiting, diarrhœa.—The root is the best part of the plant; good stomachic and diuretic; enriches and purifies the blood; lessens inflammation and pain in the joints.—The leaves are applied topically to lessen pain in the joints.—The seeds are tonic to the brain, alexiteric, appetiser; good in headache, ophthalmia, biliousness, lumbago, troubles of the spleen, asthma—.

2. *Wild-bitter-variety* :—The plant is tonic, emmenagogue, alexiteric; astringent to the bowels; cures asthma, biliousness, inflammation; enriches the blood (Yunani).

The root has tonic, demulcent and cooling properties.

The seeds are considered carminative and cordial. A decoction is used in obstructed menstruation and for checking bilious vomiting.

In Loralai, the plant is used as a cure for diarrhœa and bilious attacks (Hughes-Buller).

Arabic: Hindubar, Indyba—; *Baluchistan:* Zral—; *California:* Chicory, Ragged Sailor, Succory, Wild Bachelor's Button—; *Catalan:* Camaroja, Xicoina, Xicoira—; *Dutch:* Bitterste Cichory, Cichory, Wilde Cichory—; *English:* Bunk, Chicory, Succory, Wild Endive, Wild Cicory, Wild Succory—; *French:* Barbe de capucin, Bois de corde, Cheveux de paysan, Chicorée amère, Chicorée sauvage, Ecoubette, Herbe ă café, Herbe amĕre, Inthybe—; *German:* Blausamenwirbel, Cichorie, Hindeg, Verfluchte Jungfer, Weglunge, Wegwarte, Wegweiss, Wild Endivie, Zichorie—; *Greek:* Kichora, Kikori, Kikorion, Seris pikris—; *Gujerati:* Kasani—; *Hindi:* Kasni—; *Italian:* Cicorea, Cicoria, Radicchio—; *Loralai:* Kashin—; *Malta:* Chicory, Cicoria, Radicchio, Cicueira—; *Persian:* Kasani,

Kasni—; *Polish:* Podroznik—; *Portuguese:* Almeirao, Chicorea brava—; *Provence:* Cicoureio—; *Punjab:* Gul, Hand, Kasni, Suchal—; *Roumanian:* Cicoare—; *Russian:* Tsikorie—; *Spanish:* Achicoria, Achicoria amarga, Chicoria—; *Swedish:* Wægwarda—; *Tamil:* Kashini—; *Telugu:* Kasini—; *Urdu:* Kasani—.

2. **Cichorium endivia** Linn. Sp. Pl. (1753) 813.

Supposed to be a cultivated form of *C. intybus.* It differs from this species by the stem-leaves which are hastate at the base and smaller, and narrower glandulose-ciliate scales of the involucre, and setæ of the pappus which are four times shorter than the achenes.

Distribution: Native of the Mediterranean.—Cultivated in India.

It is much valued by the Hakims as a resolvent and cooling medicine, and is prescribed in bilious complaints.

The root is used in dyspepsia and fever as a tonic and demulcent; the fruit as a cooling remedy for fever, headache, and jaundice.

The root is considered warm, stimulating, and febrifuge; given in "Munjus", the diluent taken preparatory to purging; the seed is used in sherbets (Irvine).

Bengal: Kassin—; *Bombay:* Kasini—; *Dutch:* Andijvie—; *English:* Garden Endive—; *French:* Chicorée blanche, Chicorée endive, Chicorée frisée, Endive, Escarole, Scariole, Scarole—; *Hindi:* Kasini—; *Hova:* Saladingita—; *Italian:* Endivea, Indivia—; *Languedoc:* Enderio, Endevio, Endive—; *Portuguese:* Chicorea, Endivia, Escarolla—; *Roumanian:* Laptuca—; *Russian:* Laktuk—; *Spanish:* Escarola—; *Tamil:* Kashini—.

3. **Cichorium noeanum** Boiss. Fl. Or. III, 717.

Annual, stem glabrous, sparingly and dichotomously branching. Radical leaves runcinately pinnatipartite forming triangular laciniæ, on the margin and often on the midrib calcarious-spinulose. Upper leaves semi-amplexicaul at the base, narrowly linear. Heads at the dichotomy fasciculate sessile, the other pedunculate, the terminal ones long-pedunculate with the peduncles finally thickened. Leaves of the involucre shortly lanceolate acute glabrous, remotely spinulose-ciliate.

Flowers scarcely twice shorter than the involucre. Pales of pappus shortly linear-spathulate, 5 times shorter than the achenes, those of the inner achenes alternately produced into an awn which is almost as long as the achene.

Distribution: Baluchistan.—Mesopotamia.

The flowers are soaked in water, and the water used for sore legs and also for the stomach derangement called "dik" (Hotson).

Taraxacum Linn.

Scapigerous milky herbs,. Leaves radical, entire sinuate- or runcinate- pinnatifid. Heads solitary on leafless scapes, yellow, homogamous; flowers all ligulate. Involucre campanulate or oblong; bracts herbaceous, innermost 1-seriate, erect, subequal, sometimes connate below, unchanged after flowering; outer shorter, many-seriate, often recurved; receptacle flat, naked. Achenes oblong obovoid or narrow, 4-5-angled, or the outer dorsally compressed, beaked glabrous, 10-ribbed, ribs often muricate or echinate above, beak often very long and slender; pappus copious, hairs simple, slender, unequal.—Species 25.—Temperate regions.

T. officinale Wigg. is used medicinally in Europe, China, La Reunion.

Official:—The root of *Taraxacum spp.* (Sweden); *T. officinale* Wiggers (Great Britain, Hungary);—(Withering) Wiggers (Switzerland).

The dried plant of *T. officinale* Wigg. (Japan).

The root and the dried plant of *T. officinale* Wiggers (*Leontodon Taraxacum* Linn.) in Russia.

The leaf of *T. Dens-leonis* Linn. in France.

The root and the leaf of *T. officinale* Wiggers in Austria.

1. **Taraxacum officinale** Weber in Wigg. Prim. Fl. Holsat. 56.—Plate 558A.

A perennial herb; juice milky. Leaves all radical, sessile, usually glabrous, variable in shape, narrowly oblong, 5-20 cm.,

irregularly pinnatifid, lobes linear or triangular, acute, toothed, pointing downwards, or rarely oblanceolate and nearly entire. Heads ligulate, 0.8-5 cm. diam., glabrous, solitary on a hollow, leafless stalk 5-20 cm. long. Inner involucral bracts linear, erect, nearly equal, margins often white, tips usually thickened or hooked; outer bracts short, ovate, erect or recurved; receptacle flat, naked; flowers yellow; pappus copious, white, not feathery, soft; ligules long, spreading, 3-5-toothed, often brown on the back; style-arms long. Achenes glabrous, flattened, ribbed, narrowed to the base, minutely spiny on the upper half, abruptly contracted into a long, slender beak crowned by the pappus.

Distribution: Throughout the Himalaya, from 1,000—18,000 ft., Mishmi Mts.—Almost Cosmopolitan.

The root is diuretic, tonic, and slightly aperient. It is chiefly used in Kidney and liver disorders, and is perhaps one of the most generally prescribed remedies in Europe.

At Kironi in Baluchistan, the leaves are used for fomentations (Hughes-Buller).

Catalan: Dents de lleo, Llitso d'asa, Pixallits, Xicoina de burro—; *Chinese:* P'u kung Ying—; *Deccan:* Pathri—; *Dutch:* Paardenblœm—; *English:* Bitterwort, Blowball, Blower, Canker, Cankerwort, Clock, Crow-parsnip, Dandelion, Dashel-flower, Dentelion, Dindle, Doon-head-clock, Fortune-teller, Gowan, Irish Daisy, Milk Gowan, Monkshood, One o' clocks, Peasant's Clock, Pissabed, Priest's Crown, Stink Davie, Swinesnout, Time-Table; *French:* Chopine, Cochet, Couronne de moine, Dent de lion, Florion d'or, Laitue de chien, Liondent, Pissenlit, Salade de taupe, Tête de moine—; *German:* Ackerzichorie, Apostemkraut, Augenmilch, Bærenzahn, Bettpisser, Bettseiger, Bissanliwurzel, Butterblume, Eierblume, Feldreis, Gaddeliese, Habichtskraut, Hundslattich, Hundszahn, Jungeblume, Kuhblume, Kuhlattich, Laternenblume, Lœwenzahn, Luchten, Maistœrkel, Milchadistel, Milchrœdel, Milchstœckel, Mistfinke, Mœnchsblume, Mœnchskopf, Papankraut, Pfaffendistel, Pfaffenœrhlein, Pfaffenschnell, Pfaffenstiel, Pfefferœslein, Pferdeblume, Saumelke, Saustock, Seherrkraut, Schweinerœsl, Schwiblume, Sommerdorn, Sonnenwirbel, Teufelsrippen, Tiefstand, Weglattich, Wiesenlattich,

Zunehmkraut—; *Irish:* Cais tsearbhan—; *Italian:* Dente di leone, Smirnio, Soffione—; *Kironi:* Gulsagh—; *Ladak:* Rasuk, Yamaghikha—; *Languedoc:* Lagaina, Pissolet—; *La Reunion:* Chicoree sauvage, Pissenlit—; *Malta:* Dandelion, Dente di leone, Pisciacane, Tarassacio, Cicueira salvagga—; *Portuguese:* Dente de leao, Taraxaco—; *Punjab:* Baran, Dudal, Dudhbatthal, Dudli, Kanphul, Radam, Shamuke—; *Roumanian:* Papadie, Parasita gainelor—; *Russian:* Oduvanchik, Papovo gumentse—; *Sind:* Bathur, Buthur—; *Spanish:* Amargon, Diente de leon, Tarazacon—; *Tasmania:* English Dandelion—

Lactuca (Tourn.) Linn.

Glabrous (rarely hispid) usually milky herbs. Leaves radical and alternate, entire, coarsely toothed or pinnatifid, the margins setose-ciliate or naked; cauline leaves often amplexicaul and auricled Heads variously paniculate, sessile or pedunculate, homogamous; flowers all ligulate, yellow, purple or blue. Involucre cylindric, usually narrow; bracts usually few-seriate, often with scarious margins; the innermost elongate, subequal, the outer often very short, Receptacle flat, naked. Corollas ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, with acute or shortly setaceo-acuminate auricles (rarely prolonged into lacerate tails). Pappus copious; hairs many-seriate, very slender, simple, persistent or separately deciduous. Achenes ovoid, oblong or narrow, more or less compressed, sometimes flattened, shortly contracted at the base, abruptly or gradually produced into a beak at the apex.; faces 3-5-ribbed, the ribs slender or strong, smooth or rarely transversely rugose; beak slender or short and cylindric, more or less dilated into an entire or toothed pappiferous disk.—Species 100.—N. hemisphere, chiefly N. temperate of the Old World.

1. Leaves runcinate, pinnatifid .... 1. *L. runcinata.*
2. Nearly entire (rarely sinuate-pinnatifid) smaller leaves ...... 2. *L. remotiflora.*
3. Leaves suberect, sessile, runcinate-pinnatifid, spinulose-toothed; midrib prickly beneath .... 3. *L. scariola.*

The plant is a sedative, and the dried milk of the cultivated forms is used as a calmant. The seeds are emollient. The inspissated milky juice of the wild forms is used as a substitute for opium.

The following species are used medicinally in Europe—*L. sagittata* Waldst. and Kit., *L. scariola* Linn., *L. virosa* Linn.—; in China—*L. scariola* Linn., *L. thunbergii* Max.—; in Indo China—*L. fischeriana* DC., *L. indica* Linn.—; in North America—*L. canadensis* Linn.—; in Guiana—*L. quercina* Linn.—; in Guinea—*L. taraxacifolia* Schum. and Thonn.—.

Official :—The juice of *Lactuca spp.* (Spain), *L. altissima* Bieberstein (Portugal), *L. virosa* Linn. (Holland, Hungary, Portugal, Spain).

The flowered plant of *L. sativa* Linn. var. *longifolia* (*L. Romana* Garcin), var. *capitata* (*L. Capitata* G. Bauh. and De Cand), var. *crispa* (*L. crispa* G. Bauh and De Cand) in Portugal.

1. **Lactuca runcinata** DC. in Wight Contrib. (1834) 26.—*L. Heyneana* DC. Prodr. VII (1838) 140.—Plate 559 (under *L. Heyneana* DC.).

A tall glabrous herb 0.6-1.5 m. high; stem, erect, cylindric, hollow below, often very stout and much-branched. Leaves sessile, mostly radical, runcinate or pinnatifid, membranous, glabrous, on both sides, with spinose-ciliate often incise-serrate margins; radical leaves 10-30 cm. long, obovate, obtuse, narrowed at the base; cauline leaves few, remote, narrower, ½-amplexicaul, auricled. Heads 1.3 cm. long, cylindric, usually sessile, solitary or in small distant clusters along slender leafless branches; flowers pinkish white. Outer involucral bracts few, 1.5-3 mm. long, ovate, acute, with broad scarious margins; inner bracts 8 mm. long, linear-oblong, subobtuse, with scarious margins. Ligules narrow, shortly and bluntly 5-toothed at the apex. Anther-bases shortly setaceous-acuminate. Style-arms slender. Pappus white, soft, slender, longer than the achenes, copious. Achenes 2.5-3 mm. long, compressed, faintly ribbed, muriculate, black, tapering into a beak which is suddenly dilated into a whitish cup-like disk beneath the pappus.

Distribution: Punjab, Upper Gangetic Plain, Sind, Deccan, most plains districts of Madras Presidency.

It is used as a substitute for Taraxacum.

Marathi: Undirachakan—; *Pab:* Shamur—; *Portuguese India:* Taraxaco—.

2. **Lactuca remotiflora** DC. in Wight Contrib. (1834) 26.—PLATE 558B.

Herbaceous, 20-45 cm. high; stem slender, branched. Leaves mostly radical, sessile, 5-10 by 2.5-3.8 cm., obovate or oblong-pinnatifid, rounded at the apex, finely sinuate-toothed, glabrous. Heads usually solitary (rarely fascicled) along the naked slender branches, with peduncles nearly as long as the head. Involucral bracts, flowers, pappus and achenes as in Lactuca runcinata, but the achenes rather longer than in that plant.

Distribution: Banda, Sind, Deccan.—Arabia.

The whole plant is used as a substitute for Taraxacum.

Goa: Taraxaco—; *Gujerati:* Pathardi—; *Marathi:* Undirachakan, Undirakani—.

3. **Lactuca scariola** Linn. Sp. Pl. ed. 2, 1,119.—PLATE 560.

Erect glaucescent annual or biennial, about 0.3-0.9 m. high or sometimes up to 2 m. Stem simple up to the inflorescence, usually aculeate-setose below, terete, striate above. Stem-leaves erect-patent, obovate-oblong, undivided, sinuate-toothed or runcinate, sagittate-amplexicaul, sessile, subentire or aculeate-denticulate, 2-9 cm. long or more. Capitula 8-15 mm. long, on very short pedicels, in a cyme with spreading branches. Inner involucral bracts about 8, obtuse. Flowers about 11, yellow. Achenes striate, dark brown or greyish brown, hispidulous near the top of the body, which terminates in a slender beak of nearly the same length. Pappus white or nearly so.

Distribution: W Himalaya, 6,000—12,000 ft.—Siberia and westwards to the Atlantic.

The leaves are sweet; hæmatinic, hypnotic, stomachic, galactagogue; improve appetite; purify the blood; cure biliousness, burning

sensation, headache, troubles of the nose, bronchitis and cough due to heart disease; used in scabies, leucoderma, ophthalmia, diseases of the liver.—The seeds have a strong odour; hypnotic, analgesic, aphrodisiac; good for headache and ophthalmia; prevent the fall of hair.—The oil from the seeds has a sharp taste; good for the brain if applied to the head, the ear, or the nose; hypnotic, antipyretic; relieves inflammations and headache (Yunani).

The fresh plant is a mild sedative, anodyne, purgative, diuretic, diaphoretic and antispasmodic. It has been found useful in the treatment of the coughs in phthisis, bronchitis, asthma and pertussis.

A decoction of the seeds is commonly used as a demulcent. Boiled, and made into a confection, the seeds are given in cases of bronchitis, especially chronic ones.

Lettuce poultice is applied to burnings and scaldings, and to painful and irritable ulcers.

Arabic: Khas—; *Bengal:* Kahu, Salad—; *Catalan:* Ansiam Ilarch—; *Chinese:* Pai Chu, Wo Chu—; *Danish:* Laktuk—; *Dutch:* Latuw—; *English:* Garden Lettuce, Lettouce, Prickly Lettuce—; *French:* Laitue cultivée, Laitue des jardins—; *German:* Gartenlattich, Gartensalat, Lattich, Salat, Sommerendivie—; *Greek:* Thridax—; *Hindi:* Kahu, Khas, Salad—; *Hungarian:* Kerti salata—; *Italian:* Guado, Lactuga, Lattuga—; *Languedoc:* Lacholebri, Lachougo, Lachuga—; *Malta:* Prickly Lettuce, Lettuce, Lattuga, Hass, Hassa salvagga—; *Persian:* Kahu—; *Polish:* Lœzya—; *Portuguese:* Alface brava, Alface menor, Leituga—; *Punjab:* Kahu—; *Roumanian:* Laptuc—; *Russian:* Laktuk—; *Sind:* Kahu—; *Sinhalese:* Salada—; *Spanish:* Lechuga larga, Lechuga romana—; *Swedish:* Laktuk—; *Tamil:* Salattu—; *Telugu:* Kavu—; *Urdu:* Kahu—.

SONCHUS (Tourn.) Linn.

Annual or perennial herbs with milky juice. Leaves radical or alternate, the cauline often amplexicaul and auricled, entire, toothed or pinnatifid, the margins sometimes rigidly ciliolate or subspinous. Heads terminal, irregularly subcorymbose, umbellate or paniculate, rarely solitary, yellow, homogamous. Involucre ovoid,

campanulate, or cylindric, often dilated, thickened or conic at the base; bracts many-seriate, imbricate, herbaceous, the outer smaller. Receptacle flat, naked. Corollas all ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, the auricles shortly setaceous-acuminate. Style-branches slender. Pappus copious; hairs many-seriate, very slender, simple, usually pure white, united at the base into a deciduous ring. Achenes, ovoid, obovoid, or ellipsoid, more or less compressed, ribbed, sligghtly contracted at the base and apex. (but not beaked), glabrous, smooth or transversely rugose.—Species 45.—Old World.

A. Annual
- 1. Glabrous or sparsely glandular above .... 4. *S. asper.*
- 2. Glabrous or sparsely glandular hispid .... 1. *S. oleraceus.*

B. Perennial
- 1. Leaves runcinate-pinnatifid, spinous-toothed .... 2. *S. arvensis.*
- 2. Leaves linear-oblong, quite entire or sparingly sinuate-toothed .... 3. *S. maritimus.*

S. oleraceus Linn. is used medicinally in China, Indo China and North America.

In Spain, *S. arvensis* Linn., *S. asper* Hill., *S. crassifolius* Pourr., *S. maritimus* Linn., *S. oleraceus* Linn., *S. tenerrimus* Linn. are all used as emollients.

1. **Sonchus oleraceus** Linn. Sp. Pl. (1753) 794.—Plate 561.

A coarse erect annual 0.45-0.9 m. high; stem glaucescent, striate, branched above. Cauline leaves sessile, oblong or obovate, entire or runcinate-pinnatifid, ½-amplexicaul, with spreading acute auricles, dentate, glabrous. Heads in irregular umbellate cymes, campanulate, 1.3-1.6 cm. long, many-flowered; flowers yellow; pedicels often glandular. Involucral bracts glabrous or nearly so; outer bracts shorter than the inner, which reach 1.3 cm. long. Pappus copious, pure white, longer than the achenes. Achenes 3 mm. long, compressed, narrowly obovoid, longitudinally ribbed, distinctly transversely muriculate, light brown.

Distribution: Sparingly throughout India, Ceylon.—All temperate and many tropical countries, wild or introduced.

The brownish gum formed by evaporation of the common Sow-thistle, when taken internally in a dose of 2-4 grains, behaves as an "intensely powerful hydragogue cathartic" and acts powerfully upon the liver, duodenum, and colon. In its general effects, it is said to most resemble elaterium, producing large and watery discharges so that it has proved a valuable therapeutic agent in ascites and hydrothorax. It requires, however, great care in its administration, since it has the disadvantage of griping like senna, and producing renesmus like aloes.

An infusion of the root and leaves is used in Bengal as a tonic and febrifuge.

In Indo China, the stems are prescribed as a sedative and a tonic.

The early Cape settlers applied the juice of the plant for cleansing and healing ulcers.

Afrikaans: Melkdissel, Seidissel, Suidissel, Suigdissel—; *Antsianaka:* Beroberoka—; *Betsileo:* Anamboraka—; *Bombay:* Mhatara—; *Catalan:* Llicso, Llitso—; *Chagai:* Aghut—; *Chinese:* Ku Tsai—; *English:* Du Tistel, Hare's Lettuce, Hare's Palace, Hare's Thistle, Milk Weed, Milk Thistle, Sow Thistle, Sprout Thistle, Turn Sole—; *French:* Labyrinthe étrille, Laceron, Laisseron, Lait d'âne, Laiteron, Laiteron commun, Laitron, Laitue de murailles, Lasseron, Liarge, Palais de lièvre—; *German:* Gænsedistel—; *Hova:* Beroberokamboa—; *Indo China:* Tuc doan—; *Italian:* Cicerbita, Cicerchia, Crespignia, Crespignoli, Grispignolo, Sonca, Sparaghella—; *Kharan:* Gokizaban—; *Kotra:* Gogru—; *Languedoc:* Engraisso por, Lachassou, Lachenca, Lacheyroun—; *La Reunion:* Lastron doux, Lastron tendre—; *Malta:* Sow-thistle, Cicerbita, Crespino, Tfief—; *Mastung:* Agut—; *Mexican:* Chichicaquihuitl—; *New Zealand:* Porœua, Puwha—; *Patna:* Titaliya—; *Punjab:* Dodak—; *Roumanian:* Sussiu—; *Russian:* Zayatchiya Kapusta—; *Spanish:* Camaroja, Cerraja, Lechugilla—; *Suto:* Bono-sa-lekxwaba, Lesabe—; *Telugu:* Ratrinta—.

2. **Sonchus arvensis** Linn. Sp. Pl. (1753) 793.—*S. Wightianus* DC.; Wight Ic. t. 1,142.—Plate 562.

A tall perennial; rootstock with long slender creeping stolons which send up small tufts of radical leaves; stems glabrous, more or less angular, 0.6-1.5 m. high, hollow below. Leaves 15-30 cm. long, green and shining above, glaucous beneath, glabrous; lower leaves narrowly oblanceolate, subacute, entire or pinnatifid or runcinate-pinnatifid; middle and upper cauline leaves lanceolate, or the uppermost linear, usually undivided, abruptly acuminate, ½-amplexicaul with short rounded appressed auricles, all more or less undulate and with spinous-dentate margins. Heads few, 2.5-5 cm. across, umbellately corymbose; peduncles glandular-hairy; flowers bright yellow. Involucral bracts clothed (as is often also the upper part of the stem) with long hairs tipped with greenish yellow glands. Pappus white, silky, scarcely exceeding the involucral bracts. Achenes scarcely compressed, longitudinally ribbed and transversely rugose.

Distribution: Very sparingly throughout the plains of India, more common on the hills.—All warm countries, wild or introduced.

The plant is slightly bitter; diuretic; good in chronic fevers (Yunani).

Its properties are similar to those of *Lactuca scariola*.

Among the Santals, the root is given in jaundice (Campbell).

Bengal: Banpalang—; *Ceylon:* Musalkatha—; *English:* Corn Sow-thistle, Dindle, Gutweed, Hogweed, Rosemary, Swine Thistle, Tree Sow Thistle—; *Hindi:* Sadhi, Sahadevibari—; *Punjab:* Bhangra, Kalabhangra—; *Santal:* Birbarangan—; *Telugu:* Nallatapata—; *Urdu:* Sahadevi—.

3. **Sonchus maritimus** Linn. Syst. ed. X, 1,192.

Perennial, glabrous, glaucous; rootstock creeping; stem sparingly branched above. Leaves linear-oblong quite entire or sparingly sinuate-toothed, cauline ½-amplexicaul with acute auricles. Heads few peduncled glabrous, achenes ellipsoid subcompressed margins thickened faces with a thick middle rib and 2 more slender lateral ones.

Distribution: Punjab, Baluchistan.—Westwards to the Atlantic.

In the Punjab, it is used for the same medicinal purposes as *Lactuca scariola.*

4. **Sonchus asper** Hill, Herb. Brit. I (1769) 47.

Annual, glabrous or sparsely glabrous above; stem branched. Leaves sessile, slightly rugose; the cauline elliptic-oblong entire, or runcinate or pinnatifid, ½-amplexicaul with rounded appressed auricles, undulate, spinous-dentate or simply dentate. Heads crowded in an irregular umbel; flowers yellow. Involucral-bracts glabrous. Pappus copious, very slender, white. Achenes 3 mm. long, much compressed, elliptic in outline, longitudinally striate by fine distant ribs, not transversely muriculate.

Distribution: Throughout India.—All temperate and many tropical countries, wild or introduced.

At Loralai, the plant is pounded and applied to wounds or boils (Hughes-Buller).

In Spain, it is commonly used as an emollient.

English: Rough Sow-Thistle—; *La Reunion:* Lastron piquant—; *Loralai:* Garwa, Machal—.

LAUNAEA Cass.

Perennial glabrous herbs usually with yellow juice. Leaves mostly radical, sinuately lobed or pinnatifid; margins often with cartilaginous or subspinous teeth. Heads pedunculate or subsessile, solitary, fascicled, racemose or paniculate, homogamous; flowers all ligulate, yellow. Involucre campanulate or cylindric; bracts many-seriate, imbricate, often with scarious margins; innermost bracts subequal; the outer gradually shorter, the outermost often very short. Receptacle flat, naked. Corollas ligulate, truncate and 5-toothed at the apex. Anther-bases sagittate, with acute or shortly setaceous-acuminate auricles. Style-arms slender. Pappus copious; hairs many-seriate, simple, very slender, white, a few inner sometimes longer and stronger, all connate at the base into a deciduous ring. Achenes narrow, usually columnar, not contracted at the base or

apex, truncate at both ends, sometimes winged, 4-5-ribbed.—Species 30.—Tropics and subtropics.

A. Achenes not winged
- I. Heads terminal on the paniculately branched flowering stems
  - 1. Radical leaves sinuate lobed or pinnatifid .... 1. *L. asplenifolia.*
  - 2. Radical leaves rosulate, runcinate-pinnatifid .... 4. *L. chondrilloides.*
- II. Heads more or less racemose on the flowering stem or its branches .... 2. *L. nudicaulis.*
- III. Heads solitary or fascicled at the nodes of the flagelliform rooting flowering stems .... 3. *L. pinnatifida.*

B. Achenes winged .... 5. *L. glomerata.*

L. pinnatifida Cass. is used medicinally in Indo China.

1. **Launæa aspleniifolia** Hook. f. Fl. Brit. Ind. III (1881) 415.—Plate 563.

Biennial or perennial, glabrous. Leaves sessile or shortly petioled, 7.5-15 cm. long, narrowly obovate, sinute-lobed or pinnatifid, lobes minutely toothed, the teeth rarely white and cartilaginous; cauline leaves few. Flowering-stems 15-45 cm. long, many from the root, almost naked, branches dichotomously divaricating. Heads 1.3 cm., terminal, paniculate, the peduncles with usually 1 or 2 subulate bracts. Involucral bracts quite glabrous; outer small, inner linear, margins membranous. Achenes 2 mm., columnar, angled and ribbed, ribs rough. Pappus 8 mm., deciduous.

Distribution: Plains of Punjab and Upper Ganges, Bengal, southwards to the Circars, Burma, Andamans.

The root of this plant in combination with other drugs is given as a lactagogue by the Santals.

Bengal: Tikchana—; *Santali:* Birmalla—.

2. **Launaea nudicaulis** Hook. f. Fl. Brit. Ind. III (1881) 416.—Plate 564.

Glabrous, 15-60 cm. high, branched. Leaves 5-25 by 2.5-7.5 cm., mostly radical; lower leaves obovate-oblong, pinnatifid, with rounded or very obtuse segments, spinulose on the margins with white cartilaginous teeth; cauline leaves distant, few, sessile, narrowly oblong, pinnatifid. Flowering stems decumbent or spreading,

irregularly branched. Heads 1.3-2 cm. long, cylindric, remotely subracemose along the branches, shortly pedicelled, subsolitary or fascicled (sometimes 6-10 in a cluster), supported by leaves or naked. Involucral bracts all with broad white membranous margins; the outer very short, ovate, acute, with a strong midrib, subcordate; the innermost thrice as long as the outer, reaching 1.3 cm. long, linear, subacute, longer than the pappus, the midrib thickened in front. Pappus-hairs subequal, soft, white, copious. Achenes 2.5-3 mm. long, poly-morphous; inner sometimes as if composed of 4 thick ribs; outer slightly curved and flattened, with a thick ventral and several thick dorsal ribs, all smooth or obscurely uneven.

Distribution: More or less throughout the plains of India.—Afghanistan and westwards to the Atlantic.

In Las Bela, it is considered as a cure for fever by applying the leaves to the head of the chilren suffering (Hughes-Buller).

Kharan: Maharialoko—; *Las Bela:* Bhattri—; *Ormara:* Shatrag—; *Pab:* Kharsagut—; *Punjab:* Batthal, Dudhlak, Spudukei, Tarizha—.

3. **Launaea pinnatifida** Cass. in Ann. Sc. Nat. sér. 1, XXIII (1831) 85.—Plate 565.

Glabrous, flagelliform, procumbent; stems 0.3-0.9 m. long, rooting and leaf-bearing at the nodes and arching between them. Leaves radical and springing from the nodes; the radical 2.5-7.5 cm. long, oblong, runcinate-pinnatifid or sinuate-toothed or lobed, the teeth rarely white and cartilaginous. Heads 1-1.3 cm. long, solitary or in clusters of 1-2, arising from the nodes together with the cauline leaves; peduncles short and with several small bracts. Involucral bracts with white membranous margins; the outer small, oblong, subobtuse; the inner 1.3 cm. long, linear, subacute. Pappus 6 mm. long, deciduous, the hairs subequal, soft, white. Achenes pale, 5 mm. long, obtusely 4-gonous.

Distribution: Sandy coasts of India, Ceylon, Malay Peninsula.—Mauritius, Egypt, E. Africa.

In Bombay, it is given as a lactagogue. It is used as a substitute for Taraxacum in Goa.

The juice is applied in rheumatic affections, and used as a soporific for children.

Bombay: Pathri—; *Cutch:* Gewar—; *Goa:* Almirao—; *Gujerati:* Bhonpatri—; *Hindi:* Bankau—; *Indo China:* Pissenlit maritime—; *Marathi:* Bhonpatri, Pathradi, Paththa—; *Porebunder:* Kormani—; *Sind:* Bankahu—.

4. **Launaea chondrilloides** Hook. f. Fl. Brit. Ind. III (1881) 415.

Perennial, glabrous, or nearly so; stem erect, paniculately branched. Radical leaves rosulate, 7.5-12.5 cm. long, narrow, runcinate-pinnatifid; lobes numerous, unequal, irregularly and acutely toothed. Cauline leaves sessile, auricled, irregularly toothed or pinnatifid. Flowering branches few or many, 15-45 cm. long, stout, dichotomously branched, with small leafy bracts at the forks. Heads terminal, 1.3-2.5 cm. long, cylindric or ovoid; peduncles bracteate. Involucral-bracts glabrous, 3- or 4- seriate; the outer ovate, acute, subcordate, much shorter than the inner; innermost sometimes reaching 2 cm. long, linear-lanceolate, acute, membranous, ciliolate at the apex. Pappus soft, white, longer than the achenes, the outer hairs numerous, slender, the inner hairs much longer, reaching nearly 1.3 cm. long, rigid, and much stouter than the outer. Achenes 5-6 mm. long, narrowly oblong, truncate at both ends, strongly ribbed, the ribs slightly papillose.

Distribution: Sind, Punjab.—Afghanistan, Persia, Arabia, Egypt.

The plant is credited with the properties of a lactagogue.

5. **Launaea glomerata** Hook. f. Fl. Brit. Ind. III (1881) 417.

A glaucescent glabrous plant, with a perennial root; stems cylindric, usually numerous, 5-18 cm. long, diffuse or ascending or suberect or decumbent, almost leafless. Radical leaves 7.5-12.5 by 2.5-3.8 cm., sessile, sinuately-lobed, pinnatifid or runcinate, the lobes usually rounded and with white cartilaginous teeth. Flowering branches spreading, sparingly dichotomously branched. Heads subsessile, 1.3-1.7 cm. long, broader than in the three preceding species, campanulate, clustered at the ends of the branches; flowers yellow.

Involucral-bracts with broad membranous margins; outer ovate, small; the innermost 1 cm. long, oblong-lanceolate, acute, scarcely exceeding the pappus. Pappus 6 mm. long, deciduous; the hairs subequal, soft, white. Achenes 4 mm. long, corky, oblong, truncate at both ends, white or pale yellow, conspicuously winged.

Distribution: Kathiawar, Cutch, Sind, Mt. Abu, Punjab.—Persia, Arabia, Egypt, Algeria.

In Baluchistan, a decoction is made which mixed with some wheat meal into a poultice is applied to the eyes to cure eye-ache (Hughes-Buller).

Baluchistan: Aghut—; *Quetta:* Alko—.

GOODENIACEAE.

Herbs or shrubs; juice not milky. Leaves alternate or radical (very rarely opposite); stipules 0. Flowers hermaphrodite, often irregular, solitary or in axillary or terminal spikes, racemes, or panicles. Calyx-tube adnate to the ovary or rarely free; limb 5-fid or nearly obsolete. Corolla gamopetalous; lobes 5, valvate in bud. Stamens 5, inserted at the base of the corolla and alternate with its lobes; anthers free or connate in a ring round the style. Ovary altogether or partly inferior (rarely free), 1-2-celled; ovules in each cell 1 or many, on the dissepiment; style simple (rarely 2-fid), with a cup-shaped or 2-lipped indusium including the stigma. Fruit a drupe or capsule. Seeds albuminous; embryo straight; radicle next the hilum.—Genera 13. Species 300.—Chiefly Australia, a few N. Zealand, Polynesia, and tropical coasts.

The Order does not exhibit any well-defined medicinal property.

SCAEVOLA Linn.

Herbs or shrubs. Leaves alternate (rarely opposite), entire or toothed. Flowers axillary, on a 1-flowered peduncle between 2 opposite bracts, or at the bifurcations of a dichotomously branched

peduncle, sessile or pedicelled. Calyx-tube adnate to the ovary, turbinate, ovoid or globose; limb usually short, annular, cup-shaped or 5-partite, sometimes obsolete. Corolla oblique, split at the back to the base; lobes subequal, at length usually digitately spreading. Anthers free. Ovary usually inferior, 2- (rarely 1-) celled; ovules 1-2, erect. Indusium of the style cup-shaped, enclosing the truncate or divaricately 2-lobed stigma. Fruit a drupe; exocarp fleshy, succulent or thinly membranous; endocarp woody or bony, rarely thin and crustaceous.—Species 90.—Australia, Polynesia, tropical coasts.

S. lobelia Murr. is used medicinally in the Malay Archipelago.

1. **Scaevola frutescens** Krause in Engl. Pflanzenr. Gooden.-Brunon. (1912) 125.—*S. Koenigii* Vahl. Symb. Bot. III (1794) 36.—PLATE 566 (under *S. Koenigii*).

A shrub 1.2-3 m. high; stem 15-18 cm. diam.; branches stout, cylindric, glabrous, pale green. Leaves 11.5-20 by 3.8-9 cm., alternate, obovate, obtuse, numerous, sessile, entire, glabrous on both sides, base long-tapering, with a tuft of white wool in its axil; midrib stout, main nerves slender. Flowers white, in short axillary dichotomous cymes much shorter than the leaves, with small woolly bracts in their axils at the bifurcations; buds clavate, obtuse; pedicels short, pubescent. Calyx 6-10 mm. long, pubescent; lobes 5, rather distant, 3-4.5 mm. long, linear-lanceolate or linear-obovate, often enlarged in fruit. Corolla pubescent or glabrous outside, 2.5-3.2 cm. long; tube hairy inside; lobes 1-1.3 cm. long, spreading, elliptic-obovate, the central portion of the lobe thick and stiff, prolonged into a stout apiculus, the margins thin, membranous, irreggularly toothed and ciliate. Style exceeding 2 cm. long, curved, very hairy, protruded through the split back of the corolla-tube; cup round the stigma (indusium) 3 mm. deep, hairy, ciliate. Drupe about 2 cm. diam., subglobose, somewhat lobed, very succulent, white when ripe, crowned by the persistent calyx-lobes; stone rough, bony.

Distribution: Seashores of India, Ceylon.—Tropical East Asia, Australia, Polynesia.

The juice of the berries is instilled by the Amboyans into the

eyes to clear off opacities and take away dimness of vision (Rumphius).

Art Island: Puala—; *Betsileo:* Bararaka—; *Bombay:* Bhadrak—; *Burma:* Pinletan—; *Marathi:* Bhadrak, Bhadraksh—; *Tagalog:* Balocbaloc, Bocaboc, Bosboron, Boto, Mosboron, Panabolong, Pangangtolong—; *Tamil:* Vellamuttagam—; *Visayan:* Bocaboc, Bosboron, Boto, Mosboron, Panabolong, Panabulung, Pangangtolong, Tagustus—; *Zambales:* Linog—.

CAMPANULACEAE.

Herbs, shrubs, or undershrubs, usually with milky juice. Leaves usually alternate (rarely opposite or verticillate), entire or toothed (rarely lobed); stipules 0. Flowers hermaphrodite (rarely dioecious), axillary or terminal, solitary, subpaniculate or racemose; bracts usually small; bracteoles 0 (except in SPHENOCLEA). Calyx-tube adnate to the ovary; limb usually 5-lobed or 5-partite (exceptionally 3-10-partite), usually persistent and enlarging after the corolla withers; the lobes equal or slightly unequal. Corolla gamopetalous, tubular, campanulate, rarely infundibuliform or rotate, straight or oblique; limb regular, or oblique, or bilabiate; lobes as many as those of the calyx, short or more or less deeply divided, valvate or induplicate-valvate, rarely 1 or 2 or all the petals free to the base. Stamens as many as the corolla-lobes and alternate with them, usually inserted on the disk, sometimes on the tube of the corolla near the base or higher up and adnate; filaments free or cohering at the top or throughout their entire length; anthers linear, oblong or rarely ovate, free or united into a tube, 2-celled, the cells parallel, introrse, dehiscing longitudinally. Ovary inferior, ½-superior or rarely almost superior, 2-5- (rarely 6-10-) celled; placentae axile or attached to the middle of the septa, stipitate or peltate; ovules numerous or rarely only 2, at the base or apex of each cell, anatropous, erect, horizontal or pendulous. Style simple, clavate at the apex, papillose,

at first enclosed by the anthers, afterwards protruding beyond them; stigmatic lobes as many as the cells of the ovary. Fruit capsular, baccate or dry (in SPHENOCLEA with circumcissile dehiscence). Seeds numerous, small, testa thin or coriaceous, smooth or reticulated; embryo straight in the axis of the albumen; radicle next the hilum. —Genera 60. Species about 1,000.—Temperate and subtropical regions.

1. Capsule 2-valved at the crown .... LOBELIA.
2. Capsule with a conical superior beak,, corolla campanulate .... CODONOPSIS.

Bitter, often acrid, emetic, and narcotic. They are of little account in medicine.

Two crystalline alkaloids, lobeline and lobelidine, have been isolated from *Lobelia inflata* Linn.

OFFICIAL:—*Lobelia inflata* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Spain, Sweden, Switzerland, Turkey, United States)= *Rapuntium inflatum* Mill. (Portugal).

LOBELIA Plum. ex Linn.

Herbs or undershrubs. Leaves alternate. Peduncles 1-flowered, solitary in the axils of leaves or bracts, sometimes in a terminal raceme; bracteoles very small, usually 0. Calyx superior; limb 5-partite, the segments slightly unequal. Corolla oblique, more or less distinctly 2-lipped. Staminal tube free from the corolla or very rarely adnate at the very base; anthers 2 or all penicillate at the apex. Ovary inferior or ½-superior, 2-celled; placentæ many-ovulate. Stigma shortly 2-fid. Capsule loculicidally 2-valved within the calyx-lobes. Seeds very many, minute, ellipsoid, compressed or trigonous.—Species 220.—Tropical and temperate regions.

Acrid narcotic, and powerfully emetic.

The following are used medicinally in China—*L. radicans* Thunb.—; in North America—*L. cardinalis* Linn., *L. inflata* Linn., *L. syphilitica* Linn.—; in Mexico—*L. laxiflora* H. B. K.—; in Chile *L. tupa* Linn.—; in Cape Verde—*L. cirsiifolia* Lam.—.

OFFICIAL:—The dried flowering herb of *Lobelia inflata* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Norway, Spain, Sweden, Switzerland, Turkey, United States)=*Rapuntium inflatum* Mill. (Portugal).

1. **Lobelia nicotianaefolia** Heyne in Roth. Nov. Pl. Sp. (1821) 143; Wight Ill. t. 135.—PLATE 567A.

A very large biennial or perennial herb; stem stout, hollow, 1.2-3 m. high, branched upwards; branches cylindric, slightly pubescent. Leaves alternate, numerous, sessile or nearly so, light green, the lower sometimes reaching 45 by 5-7.5 cm., the uppermost only about 7.5 by 2 cm. and then passing into floral leaves or bracts, all oblong-lanceolate, acute, finely serrulate, usually glabrous above, glabrous or pubescent beneath, tapering at the base; midrib white; main nerves many, slender. Flowers in terminal racemes sometimes more than 30 cm. long; pedicels pubescent, each supported by a leaf-like lanceolate bract. Calyx-tube pubescent or glabrous; lobes 1.3 cm. long, about twice as long as the subglobose tube, linear-lanceolate, acuminate, with toothed and ciliate margins. Corolla 2.5-3.8 cm. long, much curved, pubescent or glabrous, white; lobes long, linear, 3 usually connate throughout. Filaments connate into a tube, 1.6 cm. long, curved, dilated at the base; anthers 6 mm. long, dark purple, linear, obtusely pointed, curved, glabrous or with a few white hairs on the back, the 2 lower often with a bunch of long white glistening hairs 2 mm. long at the tip. Capsule 8 mm. diam., subglobose, opening by 2 valves. Seeds very small, ellipsoid, compressed, yellowish brown, extremely acrid. A yellow viscid secretion is often found on the peduncles in thick drops. Odour very disagreeable.

Distribution: Konkan, Deccan, S. M. Country, W. Ghats of Bombay and Madras Presidencies, up to 7,000 ft.

The leaves are sweet, acrid, bitter; heating, aphrodisiac, stomachic, diuretic; cure "kapha", strangury, diseases of the blood, the heart, the uterus, the vagina; cure burning sensation, biliousness, erysipelas (Ayurveda).

The leaves and seeds are acrid and poisonous.

An infusion of the leaves is used as an antispasmodic.

The root in combination with other drugs is prescribed in the treatment of snake-bite (Bhavaprakasha, Rasaratnakara, Yogaratnakara) and scorpion-sting (Rasaratnakara, Vaidyavinoda); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Bengal: Badanala, Nala—; *Bombay:* Bokenal, Dawal, Dhaval, Deonal—; *Canarese:* Kadahogesoppu, Kandele—; *Cutch:* Anchi—; *English:* Wild Tobacco—; *Gujerati:* Nali—; *Hindi:* Nala, Narasala—; *Malayalam:* Kattupukayila—; *Marathi:* Devanala, Nala, Thoradevanala—; *Sanskrit:* Bibhishana, Chhidranta, Devanala, Dhamana, Dirghavansha, Kichaka, Kukshirandhra, Lalavansha, Mahanala, Mala, Mriduchhada, Mridupatra, Mrityupushpa, Nada, Nalottama, Narttaka, Nata, Nati, Potagala, Shunyamadhya, Sthuladanda, Sthulanala, Suradruma, Suranala, Vanshapatra, Vanya—; *Sinhalese:* Rasni—; *Tamil:* Kattuppugaiyilai—; *Telugu:* Adavipogaku—; *Tulu:* Katupugeri—.

Codonopsis Wall.

Perennial herbs; twiners from a tuberous root, or suberect from a fibrous root. Leaves alternate or subopposite, petioled. Peduncles axillary or terminal, 1-flowered. Flowers conspicuous, green, blue, yellowish or lurid, often purple-veined, 5- rarely 4-6- merous. Calyx superior; lobes 5, long, foliaceous. Corolla campanulate, shortly 5-lobed. Stamens 5, free, inserted on the margin of an epigynous disk; filaments somewhat dilated at the base; anthers oblong, free. Ovary at first inferior, turbinate, with a short conic superior vertex, 3-celled; style cylindric, stigma of 3 ovate or oblong lobes. Capsule somewhat fleshy, ultimately dry; beak elongated in fruit, loculicidally 3-valved. Seeds very many, small, ellipsoid, slightly compressed, smooth, brown.—Species 25.—Asia.

C. tangshen Oliver is used medicinally in Malaya.

1. **Codonopsis ovata** Benth. in Royl. Ill. Himal. Pl. 253, t. 69, fig. 3; Blatter Beautiful Fl. Kashmir II (1928) 10, pl. 36, fig. 2. —Plate 567B.

Root woody, large, spindle-shaped. Stem 15-30 cm., decumbent, then upright. Leaves 6-20 by 4-13 mm., alternate and opposite, ovate, blunt or sharp-pointed, hairy on both surfaces; stalk 3-6 mm. long. Flower-stalks 7.5-15 cm. long, at the end of the branches. Calyx-lobes 8-4 mm., elliptic-oblong, slightly hairy. Corolla 2.5-3.2 by 0.8-1.7 cm., broadly campanulate, widened upwards, sky-blue. Capsule inversely conic, depressed, 8-13 mm. broad, beak 8 mm. long. Seeds 1.5 mm. long, narrowly ellipsoid, not glistening.

Distribution: Kashmir to Garhwal, 8,000—12,000 ft.

The roots and leaves are made into poultices and employed in the treatment of bruises, ulcers, and wounds (Aitchison).

Chenab: Ludut—.

ERICACEAE.

Shrubs, trees or perennial herbs. Leaves alternate or apparently whorled, entire or serrate; stipules 0. Flowers racemed, clustered or solitary; pedicels bracteate and often 2-bracteolate. Flowers regular, or in Rhododendron sometimes irregular, sometimes dimorphic. Calyx free (or in Diplycosia sometimes much adnate to the ovary), 5- (rarely 4-6-) fid or 5-partite. Corolla hypogynous, often campanulate or urceolate, sometimes deeply lobed or (in Pyrola) petals free; lobes 5-20. Stamens 10, ovary 5, 8 or 20, hypogynous or slightly attached to the base of the corolla (in Diplycosia sometimes epigynous); filaments free; anthers oblong, opening by the pores or slits at the apex (in Diplarche by longitudinal slits), the cells often produced upwards into tubes, sometimes dorsally spurred. Ovary 5- (or 4-16-) celled; style cylindric; stigma simple or shortly lobed; ovules many in the inner angles of the cells, or placenta often pendulous from the upper angle. Fruit capsular, loculicidally or septicidally 5-valved; in Gaultheria and Diplycosia enclosed by

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the enlarged succulent calyx, appearing baccate. Seeds many (rarely few) in each cell, albumenous; testa close or loose or produced.—Genera 50. Species 1,350.—Cosmopolitan, except in deserts and in hot damp tropical regions.

1. Corolla gamopetalous. Capsule loculicidally 5-valved
   Anthers with 2 horns on their back .... GAULTHERIA.
2. Flowers racemed. Seeds linear-oblong, not margined .... PIERIS.
3. Corolla gamopetalous. Capsule septicidal
   Anthers opening by terminal pores .... RHODODENDRON.

Many are bitter, astringent and diuretic; others are stimulant, and a few narcotic.

Among the products isolated may be mentioned:—1. esters—methyl salicylate—; 2. glucosides—arbutin, gaultherin, idain, monotropitin, methylarbutin, myrtillin—; 3. pigments—gentisin, quercetin—; 4. toxic principles—andromedotoxin—.

Andromedotoxin is the poisonous constituent of several Ericaceae: ANDROMEDA, AZALEA, RHODODENDRON.

OFFICIAL:—*Arbutus Uva Ursi* Linn. (*Arctostaphylos Uva Ursi* Spreng.) in Portugal.

Arctostaphylos officinalis Wimmer & Grabowski (Austria); *A. Uva Ursi* Spreng. (Belgium, Denmark, France, Holland, Italy, Japan, Norway, Sweden, Switzerland),—(Linne) Spreng. (Germany, Russia, Turkey, United States)=*A. officinalis* Wimmer and Grabowski (Hungary).

Gaultheria procumbens Linn. (United States).

Vaccinium maderense Link.=*V. padifolium* Sm. (Portugal); *V. Myrtillus* Linn. (Austria, Holland, Norway, Russia, Sweden, Switzerland),—var. *baccis caeruleonigris* De Cand. (Portugal).

GAULTHERIA Kalm. ex Linn.

Shrubs, erect or procumbent. Leaves persistent, alternate, serrulate. Flowers small, sometimes dimorphic; racemose or axillary and solitary; bracteate and 2-bracteolate. Calyx ovoid, 5-fid, in fruit enlarged coloured succulent and enclosing the capsule. Corolla ovoid-tubular, greenish-white or reddish; teeth small, recurved. Stamens 10; filaments more or less dilated, pilose; anther-cells more

or less produced upwards, dorsally 1-2-horned; in the dimorphic flowers the stamens are small with simple anthers. Ovary 5-celled; style cylindric, stigma simple; ovules many in each cell. Capsule 5-celled, loculicidally 5-valved from the apex. Seeds many, minute, subglobose, obtusely angled.—Species 120.—America, West Indies, Indo-Malaya, Japan to Tasmania.

The oil from the fruit of the North American *G. procumbens* Linn. is antispadmodic and diuretic. It is officially admitted as a source of methyl salicylate in the United States.

1. **Gaultheria fragrantissima** Wall. in As. Res. XIII (1820) 397.—PLATE 568.

A shrub, usually small, low, and much-branched, bark orange-brown, twigs pink, young parts glabrous. Leaves numerous, persistent, 3.8-6.3 cm., on short stout petioles, oblong-oval or oblong-lanceolate, rounded at base, obtuse, bluntly apiculate, serrate, glabrous, stiff and coriaceous, venation reticulate, conspicuous, bright green, rather glaucous, and with scattered sunk glands beneath. Flowers numerous, rather small, on short drooping pedicels with a pair of bractlets below the flowers and a bract at base, closely placed in dense pubescent axillary racemes much shorter than leaves. Calyx white, segments acute, anther-spurs very sharp, reflexed; ovary pubescent; capsule small, pubescent, completely enclosed in fleshy ovoid enlarged calyx which is 8-13 mm. long, smooth, shining, deep purple-blue.

Distribution: From Nepal to Bhutan, 6,000—8,000 ft., Khasia Hills, Burma. Nilgiris, Pulneys, Travancore, above 5,000 ft.

Oil of Gaultheria—the genuine *Wintergreen* oil—is obtained from the leaves by distillation.

The oil is aromatic, stimulant and carminative. It has been given with success in acute rheumatism and sciatica, its properties corresponding to those of the salicylates, in doses of 10 minims gradually increased, preferably in capsules. The oil is also applied externally in liniments, or in the form of a suitable ointment. It has powerful antiseptic properties.

Oil of wintergreen and pure methyl salicylate are fairly potent vermicides against hookworms which are expelled dead and in a flaccid state; but they are without effect against roundworms (Caius and Mhaskar).

Java: Gandapuro—; *Lepcha:* Kalomba—; *Nepal:* Machino—; *Sinhalese:* Welkapuru—.

PIERIS D. Don.

Trees or shrubs; branches terete. Leaves alternate, petioled, persistent, entire or serrulate. Racemes axillary or panicled at the ends of the branches; pedicels bracteate and 1-2-bracteolate. Calyx 5- fid or -partite; segments open or valvate in the bud. Corolla ovoid; lobes 5, short, recurved. Stamens 10; filaments with 2 horns divaricate from its apex; anther-cells ovoid, truncate. Ovary globose, 5-celled; style cylindric, stigma capitellate; ovules very many in each cell. Capsule globose, loculicidally 5-valved. Seeds many, linear-oblong, falcate, not winged; testa loose.—Species 10.—N. America, Asia.

The genus is therapeutically inert.

1. **Pieris ovalifolia** D. Don in Edinb. Phil. Journ. XVII (1834) 159.—PLATE 569.

A deciduous shrub or small tree up to 2.4 m. girth and 6 m. high. Bark reddish brown, rough, with somewhat regular vertical furrows 2.5-5 cm. apart, often deeply cleft, exfoliating in loose fibrous strips. Blaze 1.3-7.5 cm., almost entirely composed of dead tissue. Leaves 6.3-15 by 2.5-7.5 cm., ovate or elliptic, acute or acuminate, entire, base rounded, coriaceous, more or less tawny-pubescent on both surfaces when young, glabrous or glabrescent when mature. Petiole 5-13 mm. long. Flowers 7.5-13 mm. long, white, in simple terminal and axillary racemes 5-15 cm. long, a few flowers towards the base of the raceme usually in the axils of small leaves, all the flowers directed downwards. Pedicels 3.8-7.5 mm. long. Calyx-segments 2.5-6 mm. long. Corolla ovoid, pubescent without. Filaments with or without 2 minute apical horns. Capsule 5 mm. diam. globose, supported by the persistent calyx.

Distribution: Temperate Himalaya, from Kashmir to Sikkim and Bhutan, 10,000—13,000 ft., Khasia Mts., Burma.—Japan.

The young leaves and buds are poisonous to goats; they are used to kill insects and an infusion of them is applied in cutaneous diseases (Gamble).

Bashahr: Erau, Ladrang, Yerta—; *Bhutia:* Piazay—; *Garhwal:* Angyar—; *Hindi:* Ayar, Anyar—; *Jaunsar:* Anyar, Ayar—; *Kumaon:* Ayar—; *Lepcha:* Kangchior—; *Nepal:* Aigiri, Angiar, Anjir, Jagguchal—; *Punjab:* Ailan, Aira, Arur, Arwan, Ayatta, Bhel, Eilan, Eilaur, Ellal, Eran, Erana, Piru, Rattankat, Sarlakhtai, Yarta—.

RHODODENDRON Linn.

Trees or shrubs, sometimes very small; often scaly or aromatic. Leaves alternate, often clustered towards the ends of the branches, rarely subopposite or falsely whorled, entire, coriaceous. Flowers fascicled or subcorymbose, terminal, rarely solitary or axillary; bracts broad, generally caducous; bracteoles linear. Calyx 5-lobed, sometimes small or obsolete, rarely saucer-shaped, persistent. Corolla campanulate, widely funnel-shaped or cylindric, tube long or short, lobes 5-10. Stamens 5-18, usually 10; anthers oblong, dehiscing by terminal pores. Ovary 5-20-celled; style long or short, stigma capitate; ovules very many in each cell. Capsule short woody, or elongate thinner 4-20-celled, septicidally 4-20-valved from the apex, valves breaking away from the placentæ. Seeds very many, ellipsoid, albuminous; testa close or loose, often shortly crested, or tailed at one or both ends.—Species 250.—Mountains of Europe, Asia, Malaya and N. America.

A. Capsule elongate, acute; valves twisting after dehiscence. Seeds very long-tailed
   Leaves eglandular beneath .... 7. *R. javanicum.*
B. Capsule ovoid, cylindric or oblong
   I. Leaves beneath glabrous or tomentose, without glandular scales. Corolla widely funnel-shaped or campanulate. Large shrubs or trees
      a. Leaves lanceolate or oblong, narrowed at both ends .... 1. *R. arboreum.*
      b. Leaves elliptic, subobtuse at both ends .... 2. *R. campanulatum.*
   II. Leaves sprinkled beneath with sessile round glandular scales. Large or small shrubs
      a. Calyx prominently lobed, lobes longer than broad
         1. Leaves from obovate to lanceolate, glabrous, not setose .... 3. *R. lepidotum.*

2. Leaves elliptic-obovate, obtuse, scaly on both surfaces and often bristly beneath .... 4. *R. setosum.*
3. Leaves petioled, elliptic, subobtuse at both ends, glabrous above, densely scaly beneath .... 5. *R. anthopogon.*

b. Calyx very shortly, not obtusely lobed .... 6. *R. cinnabarinum.*

The leaves are sudorific, astringent, and narcotic.

The following species are used medicinally in Europe—*R. ferrugineum* Linn., *R. hirsutum* Linn., *R. ponticum* Linn.—; in Siberia—*R. chrysanthum* Prel.—; in China—*R. hunnewellianum* Rehder and Wilson, *R. metternichi* Sieb. and Zucc., *R. sinense* Sw.—; in Persia—*R. ponticum* Linn.—; in the Malay Archipelago—*R. javanicum* Benn.—; in North America—*R. maximum* Linn.—.

Popular tradition ascribes a poisonous quality to the honey made from the blossoms of *R. californicum* Hook., *R. ponticum* Linn.

1. **Rhododendron arboreum** Sm. Exot. Bot. t. 6.—Plate 570.

A small evergreen tree up to 1.5 m. girth and 7.5 m. high. Bark pinkish brown, somewhat rough, exfoliating in thin flakes. Blaze 5-13 mm., white or pinkish. Young shoots clothed with white scales. Leaves 7.5-15 by 3-5.5 cm., crowded towards the ends of the branches, lanceolate or oblong, narrowed at both ends, glabrous and glossy green above, pale beneath from a film of small white scales, the midrib and nerves prominent beneath. Petiole stout, 1.3-2.5 cm. long, clothed with white scales when young. Flowers 2.5-5 cm. long, deep red or pale pink, crowded in large rounded corymbs. Pedicels 0-7.5 mm. long. Corolla campanulate. Ovary mealy or rusty-woolly. Capsule 2.5 cm. by 7.5 mm., cylindric, curved, mealy, longitudinally ribbed.

Distribution: Temperate Himalaya, from Kashmir to Bhutan 5,000—11,000 ft., Khasia Hills, 4,000—6,000 ft., Burma, Nilgiris, Pulneys, Travancore, above 5,000 ft.

The young leaves are poisonous. They are also medicinal, and applied to the forehead for headache.

The honey of the wild bee is said, in Sikkim, to be poisonous at the flowering time of this species.

Almora: Brons—; *Badaga:* Bili, Pu—; *Bashahr:* Bras, Shrak—; *Bhutia:* Etok—; *Burma:* Zalatni—; *Canarese:* Bili, Pu—; *Chamba:* Cheu—; *Garhwal:* Burans—; *Hazara:* Chahan, Chhan—; *Jaunsar:* Burans—; *Kumaon:* Bras, Brus—; *Lepcha:* Etok—; *Malayalam:* Kattupuvarasu—; *Nepal:* Bhorans, Ghonas, Gurangs, Guras, Lalguras, Tagghu—; *Nilghiris:* Billi, Pumaram—; *North-Western Himalayas:* Brons, Burans—; *Punjab:* Ardawal, Aru, Bras, Broa, Chacheon, Chiu, Mandal—; *Sinhalese:* Maratmal—; *Tamil:* Alingi, Billi—; *Trans-Indus:* Trikhgandere—; *Western Himalayas:* Burans, Chiu—.

2. **Rhododendron campanulatum** D. Don in Mem. Wern. Soc. III, 410.—PLATE 571.

An evergreen shrub often only 1.8-2.4 m. high but sometimes 4.5-6 m. high with stems up to 0.9 m. girth. Stems spreading and nearly always procumbent towards the base. Bark smooth, pinkish brown, exfoliating in thin almost papery flakes. Blaze 2.5 mm,. pale orange- or reddish- brown. Leaves 7.5-12.5 by 4.3-6.3 cm., crowded towards the ends of the branches, elliptic or elliptic-oblong, rounded at both ends, mucronate, glabrous and glossy dark green above, clothed beneath with dense cinnamon- or buff- coloured tomentum which obscures the nerves, midrib prominent beneath, leaf-margins often curved inwards towards the midrib beneath. Petiole stout, 1-2 cm. long. Flowers 2.5-3.8 cm. long, white tinged with mauve or lilac and spotted inside anteriorly with pinkish purple, in lax corymbs. Pedicels 1.8-2.5 cm. long. Corolla campanulate. Ovary glabrous. Capsule 1.8-3 cm. by 6-7.5 mm., cylindric, more or less curved, longitudinally furrowed.

Distribution: Alpine Himalaya, from Kashmir to Bhutan, 9,000—14,000 ft.

The leaves are poisonous to goats. Mixed with tobacco, it is made into a medicinal snuff, useful in colds and hemicrania. They are also used in chronic rheumatism, syphilis, and sciatica. The dried twigs and wood are used in Nepal as a medicine in phthisis and chronic fevers.

Bashahr: Simrang—; *Garhwal:* Chimura, Semru, Simris—; *Hindi:* Cherailu—; *Kashmir:* Gaggar, Yurmi—; *Kulu:* Shargar—; *Kumaon:* Chimul—; *Nepal:* Cheraidhu, Cheriala, Nilochimal,

Teotosa—; *North-Western Provinces:* Chimul—; *Punjab:* Sarngar, Shargar, Shinwala, Simrung—; *Tehri-Garhwal:* Simris—; *Tibet:* Bargi—.

3. **Rhododendron lepidotum** Wall. Cat. 758.—PLATE 572A.

A small shrub 15 cm. to 1 m. high with erect stems up to 9 mm. diam. often curved at the base. Bark pale brown, slightly rough. Young shoots reddish brown with scattered scales. Leaves 1.5-4.5 by 0.6-1.3 cm., crowded towards the ends of the branches, oblanceolate or oblong-lanceolate, acute or rounded at the apex, more or less densely dotted on both sides with rounded scales, subsessile. Flowers 2.5-3.2 cm. diam., bright red or majenta, solitary or 2-3 together. Pedicels 1.3-2.5 cm. long, scaly, the same bright colour as the corolla. Corolla-tube 5 mm. long, as broad as or broader than long; lobes spreading, rounded. Ovary scaly. Capsule 7.5 mm. long, oblong, tapering, upwards, prominently 5-ribbed, the tip clothed with pale yellowish scales and capped by the stout persistent curved style 3.8 mm. long.

Distribution: Temperate and Alpine Himalaya, from Kashmir to Bhutan, 8,000—15,000 ft.

It is credited with the same properties as *R. anthopogon.*

Bhutia: Tsaluma, Tsuma—; *Garhwal:* Taghistra—; *Nepal:* Bhalesunpate—; *Northern India:* Talisfar—; *Simla:* Taliori—; *Tehri-Garhwal:* Simris—.

4. **Rhododendron setosum** D. Don in Mem. Wern. Soc. III, 408.—PLATE 572B.

A small shrub, 30 cm. high; branchlets bristly. Leaves 12 by 6 mm., elliptic-obovate, obtuse, scaly on both surfaces, and often bristly beneath. Pedicels 6 mm. long, 3-8, clustered, glandular-scaly. Calyx-lobes 4-6 by 3-4 mm., elliptic, obtuse, glandular-scaly. Corolla red, tube very short, 5 mm. long, lobes 12 by 6 mm., oblong, spreading. Stamens 8, sometimes 10; filaments hairy below. Ovary 5-celled, glandular-scaly. Capsule 6 by 5 mm., ovoid, hardly larger than the calyx-lobes. Seeds ellipsoid, subacute at the ends; testa close, not produced.

Distribution: Nepal, Sikkim, 13,000—16,000 ft.

It is credited with the same properties as *R. anthopogon.*

Bhutan and Tibet: Tsallu—.

5. **Rhododendron anthopogon** D. Don in Mem. Wern. Soc. III, 409.—PLATE 573A.

A small evergreen shrub 0.3-0.6 m. high with stems up to 2 cm. diam., the basal portion more or less procumbent and densely branched. Bark slightly rough, pinkish brown or grey, exfoliating in papery strips. Young shoots scaly and pubescent. Leaves 1.3-3.3 by 0.8-2 cm., crowded towards the ends of the branches, elliptic or elliptic-oblong, thick, margins recurved, clothed above with scattered yellow scales when young, becoming glabrous when mature, clothed beneath with a dense layer of scales which are yellow on the young leaves becoming ferruginous as the leaves mature, subobtuse at both ends. Petiole 2.5-7.5 mm. long. Flowers 1.5-2 cm. diam., very pale yellow and almost translucent, in dense 4-12-flowered corymbs. Pedicels very short. Corolla-tube 7.5-13 mm. long, cylindric; lobes spreading, elliptic-obovate. Ovary scaly. Capsule 2.5-5 mm. long, ovoid, tapering gradually to a blunt point, prominently 5-ribbed, dotted with pale yellowish scales and capped by the short erect style 1.2 mm. long.

Distribution: Alpine Himalaya, from Kashmir to Bhutan, 11,000—16,000 ft.—Central and N. Asia.

The leaves are aromatic, their smoke is considered useful in some diseases. They are supposed to have stimulant properties.

The leaves are administered as an errhine to produce sneezing (Honigberger).

This is one of the species which is thought by the Bhutias to excite the headache and nausea which attend ascents to the high elevations of the Eastern Himalaya.

Bhutia: Palu—; *Jhelum:* Nera, Nichni, Rattankat—; *Kashmir:* Talisfar, Tazaktsum—; *Lepcha:* Paluchulu—; *Nepal:* Dhupi—; *Punjab:* Kaizaban, Morua, Nera, Nichni, Rattankat, Talisa, Talishang, Talisri—.

6. **Rhododendron cinnabarinum** Hook. f. Rhod. Sikkim Himal. t. 8; Hook. Bot. Mag. t. 4788.—PLATE 573B.

A large shrub, 1.2-2.4 m. Bark thin, reddish grey. Leaves 5-7.5 by 2.5-4.5 cm., acute or obtuse, beneath nearly white or cinnamoneous, with scattered glandular scales, oblong or elliptic. Petioles terminal or clustered, 3-8 mm. Pedicels 0.6-1.3 cm., squamose or glabrous. Bracts glabrous, with ciliate margins. Flowers orange-rose or brick-red or scarlet. Calyx-lobes small, unequal or obsolete. Corolla-tube long, narrow, campanulate, lobes ovate, 3.2-0.8 cm., pendulous. Stamens 10. Filaments pilose at base. Ovary 5-celled, glandular-scaly. Capsule 8-13 by 6 mm. Seeds ovoid or trigonous. Testa close, hardly produced at all. A most variable plant.

Distribution: Sikkim, 10,000—12,000 ft., Bhutan, 10,000 ft.

The leaves are universally considered poisonous to cattle and goats. If employed as fuel, the smoke causes inflammation of the eyes and swelling of the face.

Lepcha: Kechung, Kema—; *Nepal:* Bulu, Sanuchimal—.

7. **Rhododendron javanicum** Benn. Pl. Jav. Rar. 85, t. 19.

A large shrub. Leaves 15 by 3.8 cm., lanceolate narrowed at both ends glabrous eglandular, primary nerves either oblique to or at right angles with the midrib, sometimes obscurely punctate beneath; petiole 8 mm. Corymbs many-flowered, umbels solitary, pedicels 3-12, 2.5-5 cm., nearly glabrous; bracts 3.8 cm., linear-oblong. Calyx obsolete. Corolla 5 cm. long, and as much in diam., rose-orange or brick-red, glabrous without, wide-funnel-shaped from a tubular base; lobes 5, round. Stamens 10; filaments glabrous. Ovary glabrous or glandular-scaly; style usually glabrous; stigma large, peltate. Capsule 2.5 by 0.5 cm., acute.

Distribution: Malay Peninsula.—Sumatra, Java, Celebes.

The leaves are used in rheumatism and syphilis.

PLUMBAGINACEAE.

Herbs or shrubs often maritime. Leaves: radical rosulate; cauline alternate; stipules 0. Flowers regular, hermaphrodite, sessile or shortly pedicelled, on simple or branched scapes or peduncles, solitary, capitate or spicate, the spikes solitary or panicled, often unilateral; bracts usually rigid, dry, with scarious margins. Calyx inferior, gamosepalous, tubular or infundibuliform, 5-10-ribbed, often hyaline between the ribs; limb more or less distinctly 5-lobed. Corolla hypogynous, gamopetalous, hypocrateriform; or petals nearly or wholly free, oblanceolate or obovate, imbricate. Stamens as many as and opposite the corolla lobes or petals, adnate to the tube or base of the claw, or inserted with the petals on a narrow hypogynous ring. Ovary free, 1-celled, often 5-sulcate; styles 5, free from the base or more or less connate; ovule solitary, anatropous, suspended from a long basal funicle. Fruit included within the calyx (rarely exserted), dry, dehiscent or indehiscent. Seed filling the cell, pendulous from the apex of the funicle or more or less adnate to it; testa membranous; albumen farinaceous, copious, scanty, or 0.—Genera 10. Species 280.—Cosmopolitan, especially on salt steppes and seacoasts.

A. Style 1, filiform, divided into 5 stigmatose branches
    Calyx glandular. Stamens free. Flowers spicate .... PLUMBAGO.
B. Styles 5, distinct. Stigma subcapitate
    Herbs or small shrubs with obovate leaves .... STATICE.

Generally tonic and astringent; occasionally acrid and caustic. A compound of still doubtful composition, plumbagin, has been isolated from several species of PLUMBAGO.

PLUMBAGO Tourn. ex Linn.

Perennial herbs or undershrubs, sometimes scandent. Leaves alternate, membranous, entire (in 1 species absent), amplexicaul and auricled at the base, or with a petiole which is often dilated and amplexicaul. Flowers white, rose-coloured, or blue, in terminal spikes; bracts and bracteoles shorter than the calyx, sometimes

minute. Calyx tubular, 5-toothed, clothed with prominent stipitate glands. Corolla hypocrateriform; tube long, slender; limb spreading, with 5 equal or slightly unequal entire lobes. Stamens hypogynous, free from the corolla; filaments dilated at the base; anthers linear-oblong. Ovary attenuated at the apex into a terminal filiform style which divides above into 5 longitudinally stigmatose branches. Capsule membranous, at length circumciss near the base, the deciduous part often splitting into 5 valves from the base to the apex.—Species 10.—Cosmopolitan.

1. Corolla white .... 1. *P. zeylanica.*
2. Corolla red .... 2. *P. rosea.*

The root and the leaves are acrid and emetic.

The following are used medicinally in Europe—*P. europaea* Linn.—; in China and in the Philippine Islands—*P. zeylanica* Linn.—; in Mexico—*P. pulchella* Boiss.—; in the West Indies and in Brazil—*P. scandens* Linn.—; in Guiana—*P. rosea* Linn., *P. scandens* Linn.—; in the Gold Coast, La Reunion, and New Caledonia *P. zeylanica* Linn.—; in South Africa—*P. capensis* Thunb.,—*P. zeylanica* Linn.—.

The toxic principle "plumbagin" has been obtained from *P. capensis*, *P. europaea*, *P. larpentae* Lindley, *P. rosea*, *P. scandens*, and *P. zeylanica*.

1. **Plumbago zeylanica** Linn. Sp. Pl. (1753) 151.—Plate 574A.

A perennial herb, sometimes, in shady places, subscandent; stems 0.6-1.5 m. long, somewhat woody, spreading, terete, striate, glabrous. Leaves thin, 3.8-7.5 by 2.2-3.8 cm., ovate, subacute, entire, glabrous, somewhat glaucous beneath, reticulately veined, shortly and abruptly attenuated into a short petiole; petiole narrow, amplexicaul at the base and there often dilated into stipule-like auricles. Flowers in elongate spikes; rhachis glandular, striate; bracteoles ovate, acuminate, shorter than the calyx, glandular or not. Calyx 1-1.3 cm. long, narrowly tubular, persistent, densely covered with stalked glands; teeth small, with membranous margins. Corolla white,

slender; tube 2-2.5 cm. long; lobes 8 mm. long, obovate-oblong, acute, apiculate. Filaments as long as the corolla-tube; anthers exserted just beyond the throat. Capsule oblong, pointed; pericarp thin below, thick and hardened above.

Distribution: Throughout India, much cultivated, wild in the W. Peninsula and probably in Bengal, Malay Peninsula, Ceylon.—Tropics of the Old World.

The root and root bark are bitter, hot, dry; stomachic, carminative, astringent to the bowels, anthelmintic, alterative; cure intestinal troubles, dysentery, leucoderma, inflammation, piles, bronchitis, "vata" and "kapha", itching, diseases of the liver, consumption, ascites, "tridosha"; good in anæmia (Ayurveda).

The root has a bitter sharp taste; bechic, laxative, expectorant, stomachic, tonic, abortifacient, alexipharmic; good appetiser; useful in laryngitis, rheumatism, diseases of the spleen, leucoderma, ringworm, scabies.—The leaves are caustic, vesicant, aphrodisiac; good for scabies (Yunani).

The root of *P. zeylanics* is said to increase the digestive power, to promote the appetite, and to be useful in dyspepsia, piles, anasarca, diarrhœa, skin diseases, etc. For external administration, it is made into a paste with milk, vinegar or salt and water. Such a paste may be applied externally in leprosy and other skin diseases of an obstinate character, and be allowed to remain until a blister has formed.

A tincture of the root-bark has been employed as an antiperiodic. It acts as a powerful sudorific.

The milky juice is used as an application to unhealthy ulcers and in cases of scabies.

The plant is used as a vulnerary in New Caledonia.

In the Gold Coast, the roots are used as an enema to cure piles.

The Tongas and Shangaans use the root as a leprosy remedy. The powdered material is taken internally and applied locally.

A compound powder consisting chiefly of *P. zeylanica, Hydrocotyle asiatica,* and *Acorus calamus* was administered for a considerable length of time to two cases of hemiplegia without any benefit (Koman).

1. The active principle is plumbagin and the pharmacological actions of the plant are due to the presence of this neutral principle. —2. Externally it is a strong irritant and has a powerful germicidal action on bacteria and unicellular organisms.—3. The principal action of plumbagin is on the muscular tissue which it stimulates in smaller doses and paralyses in larger ones.—4. It stimulates the contraction of the muscular tissue of the heart, intestines, and uterus. The action is deep-seated.—5. It stimulates the secretion of sweat, urine, and bile.—6. It has a stimulant action on the nervous system. —Thus the use of *P. zeylanica* in indigenous medicine as a rubefacient, vasicant, local ecbolic, and sudorific, has a rational basis (Bhatia and Lal; *Ind. Journ. Med. Research;* January, 1933).

Arabic: Shitaraj—; *Bengal:* Chita, Chitruk, Sufaid—; *Bombay:* Chitra, Chitrack—; *Burma:* Kanchopphiju, Kinkhenphiu—; *Canarese:* Chitramula, Chitramulike, Mulike, Vahni—; *Chinese:* Pai Hua T'eng, Pe Hoa T'en—; *Deccan:* Chitarmul, Chitarmulam—; *Elgon:* Chepkaset—; *English:* Ceylon Leadwort, White-flowered Leadwort—; *French:* Dentelaire—; *Gujerati:* Chitaro, Chitrak, Chitro, Gholochitro—; *Hindi:* Chita, Chitarak, Chitawar, Chiti, Chitra—; *Ilocano:* Bangbang, Talangcao, Talangcaw—; *Kikuyu:* Mohehe—; *Lumbwa:* Serenguet—; *Malayalam:* Tumpukotuveli—; *Marathi:* Chitraka, Chitramula—; *Mundari:* Citur—; *Nandi:* Chepkwaret—; *Nepal:* Chitu—; *Persian:* Bighbarindeh, Shitarak, Shitirak—; *Punjab:* Chitrak—; *Sanskrit:* Agni, Agnimata, Agnisikha, Anala, Analanama, Barhi, Bhali, Brihadbhanu, Chitra, Chitraka, Chitranga, Dahaka, Dahana, Daruna, Dvipi, Himarati, Hiranyareta, Hutabhuk, Jataveda, Jyotishka, Krishanu, Krishnavartma, Kuta, Lohitanga, Pachi, Palaka, Pali, Pathi, Pathina, Pavaka, Saptarshi, Shambara, Shardula, Shikhavana, Shikhi, Shuchi, Shura, Shushma, Shwetachitraka, Ushana, Vaishavanara, Vallari, Vanhi, Vanhinama, Vibhakara, Vibhavasu, Vyala—; *Shangaan:* Musisi—; *Sinhalese:* Ellanitul, Sudunitul—; *Tagalog:* Sangdigequit—; *Tamil:* Adigarradi, Akkini, Angodiveli, Kanilam, Kanilindiran, Karimai, Kodiveli, Koduveli, Sadaveda, Sittragam, Sittramulam, Tigana, Vanama, Vellaikkodiveli, Vengodiveli—; *Telugu:* Agnimata, Chitramulamu, Tellachitramulamu—;

Tigrinia: Aftah, Aftehe—; *Twi:* Ahyewgya, Orpapohwea—; *Urdu:* Chitalakri—; *Uriya:* Chitamulo, Chitaparu, Krisanu, Ogni—.

2. **Plumbago rosea** Linn. Sp. Pl. ed. 2 (1762) 215.—PLATE 574B.

Stems herbaceous, erect, terete, slightly striate, simple, upwards branching. Leaves large, oblong, attenuate and slightly obtuse upwards, short-cuneate at the base, passing into a very short, amplexicaul, exauriculate petiole. Flowers 3-5 cm. long, forming very long terminal and axillary, lax spikes, which after flowering reach 30-60 cm.; rhachis quite glabrous. Bracteoles ovate-cuspidate, subequal, 4 times shorter than the calyx, almost pellucid. Calyx red, short-cylindric, shortly and acutely 5-dentate, along the ribs covered with stipitate, bifarious and subsessile glands. Corolla-tube slender, 4 times as long as the calyx, limb wide, segments ovate, rotund, cuspidate.

Distribution: Cultivated throughout India. Perhaps a native of Sikkim and Khasia.

The root has the same properties as that of *P. zeylanica;* fattening, alterative; cures leprosy (Ayurveda).

The bruised root of this plant is, in its natural state, acrid and stimulating, but when tempered with a little bland oil it is used as an external application in rheumatic and paralytic affections; it is also prescribed internally in small doses for the same complaints, in combination with some other simple powder.

The vesicant properties of the root of this plant were known to the old writers, but it was O'Shaughnessy who first tried this drug in between three hundred and four hundred cases, and found out that the root-bark, being rubbed with water into a paste and applied to the skin, raised blisters within twelve or eighteen hours; and that it can be used as a cheap substitute for Cantharides, with the additional advantage of causing no irritation of the genito-urinary organs. When administered internally it acts as a stimulant, and in large doses as an acro-narcotic poison. It is one of the articles in use amongst the natives for procuring abortion. For this purpose, the scraped root-bark is introduced *per vaginam* into the *os uteri.* Death is often

the inevitable consequence of the use of this substance in the manner specified. The root is also used as a powerful sialogogue. In South India, the dried root is highly valued as a remedy for secondary syphilis and leprosy.

Waring found that it caused more pain than an ordinary blister, and that the resulting vesication was less uniform, and not always easily healed. From what I have seen of its use, I am inclined to support Waring's opinion (Dymock).

The milky juice is useful in ophthalmia and as an external application for scabies. Its vesicating properties have been successfully utilized in curing certain cases of leucoderma.

The root in combination with other drugs is prescribed for snake-bite (Sushruta, Vagbhata) and scorpion-sting (Sushruta); but the drug is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

A chemical examination of the root-bark of *P. rosea* is due to Tummin Katti and Patwardhan (*Journ. Ind. Inst. Sc.;* 1932).

Arabic: Chittermul, Shitarajehmar, Shitturridge—; *Bengal:* Chitra, Lalchita, Raktochita, Raktochitra—; *Bombay:* Lalchitra—; *Burma:* Chuvondacoduvallie, Kanchopni, Kenkhyokeni, Kinkhenni—; *Canarese:* Kempuchitramula—; *Central Provinces:* Chitrak—; *Deccan:* Lalchitarmul, Lalchitarmulam—; *English:* Fire Plant, Officinal Leadwort, Rosy-flowered Leadwort—; *Gujerati:* Lalchitrak, Ratochatro—; *Hindi:* Chitra, Lalchita, Lalchitarak, Lalchitra, Rakta-chitra—; *Kashmir:* Shitranj, Shitray—; *Malay:* Cheraka merah—; *Malayalam:* Chettikotuveli, Chuvannakotuveli—; *Marathi:* Lalchitra, Tambadachitramula—; *Persian:* Shitarakesurkh—; *Sanskrit:* Agni, Atidipya, Chitraka, Chitranga, Chitravalli, Dahaka, Daruna, Dipika, Dvayagni, Hrasvagni, Kala, Kalamula, Mahanga, Marjara, Pathi, Pavaka, Raktachitra, Raktachitraka, Raktasikha, Usharbudhavhaya, Vahnimula, Vyala—; *Sinhalese:* Ratnettol, Ratnitul—; *Tamil:* Akkini, Sengodiveli, Sengoduveli, Segappugodiveli, Sittiramulam—; *Telugu.* Errachitramulam—; *Tulu:* Kempuchitramula—; *Uriya:* Rongachitamulo—.

STATICE Linn.

Herbs or small shrubs. Leaves alternate, often rosulate or fascicled, entire (in the Indian species), spathulate-oblong or obovate. Flowers in unilateral bracteate panicled spikes arranged along the branches of a leafless peduncle or scape; bracts subtending the spikes short, squamiform, amplexicaul, coriaceous on the back and with membranous margins; bracteoles sheathing the flowers. Calyx tubular or infundibuliform; tube ribbed; limb scarious, plicate, often coloured, spreading in flower, with 5 nerves excurrent into teeth or awns, rarely deeply 5-lobed, or almost obsolete, or reduced to plumose awns, or to 5 recurved mucros. Petals spathulate-oblong, entire or 2-partite, united at the base into a ring with the stamens. Styles 5, distinct, at the angles of the ovary; stigmas subcapitate. Utricle included in the calyx, indehiscent, or circumciss, or variously fissured. Seed filling the cell, more or less albuminous.—Species 130.—Cosmopolitan.

The genus is therapeutically inert.

1. **Statice cabulica** Boiss. in DC. Prodr. XII, 666.

Glabrous, glaucous, calcareous, powdery. Leaves many, in very dense rosettes, cuneate-spathulate, obtuse, mucronate, subsessile at the base and attenuate, 5-7-nerved. Scapes virgate, terete, high branched; branches elongate, paniculate; spikelets 1-2-flowered, distantly arranged along the branches very laxly spicate. Lower bract coriaceous, triangular, mucronate, the inner one 3 times as long, membranous, aristate. Calyx-tube thin, cylindrical, appressedly puberulous; limb shorter than the tube, finally divided to the base into 5 linear spreading recurved lacineae which are, except for the nerve, membranous.

Distribution: Baluchistan, Waziristan.—Afghanistan.

The plant is used as a cure for stomach-ache in Baluchistan (Hughes-Buller).

Baluchistan: Mashnawaro—.

PRIMULACEAE.

Perennial (rarely annual) herbs. Leaves radical or cauline; stipules 0. Flowers hermaphrodite, regular. Calyx inferior (except SAMOLUS), 5-(rarely 4-9-) cleft. Corolla usually hypogynous (0 in GLAUX), rotate, campanulate or infundibuliform, 5-(rarely 4-9-) cleft. Stamens inserted on the corolla-tube and opposite to its lobes (hypogynous when there is no corolla); filaments usually short; anthers 2-celled, bursting inwards by slits (rarely by terminal pores), pollen angular. Ovary 1-celled, usually free, ovoid or subglobose; ovules many, usually amphitropous, on a free central placenta; style short or long, continuous with the ovary; stigma undivided. Capsule 1-celled, dehiscing by simple or 2-fid valves or transversely. Seeds few or many, minute, usually angular, often sunk in the placenta; albumen fleshy or horny; embryo terete, parallel to the hilum.—Genera 25. Species 550.—Cosmopolitan but especially N. temperate.

1. Corolla salver- or funnel- shaped, tube long. Stamens on the corolla-tube. Anthers obtuse .... PRIMULA.
2. Corolla 5-partite, exceeding the calyx .... ANAGALLIS.

The herb is astringent, the root bitter and more or less acrid.

Glucosides—cyclamin, primaverin, primulaverin—have been isolated from various members.

OFFICIAL:—*Cyclamen europaeum* Linn.=*C. littorale* Sadler (Portugal).

PRIMULA Linn.

Perennial scapigerous herbs. Flowers umbelled or whorled, rarely solitary, often dimorphic, one form having the stamens low and stigma high in the corolla-tube, the other having the stamens high and stigma low. Calyx 5-cleft. Corolla funnel- or salver- shaped, throat naked or with folds opposite the lobes (annulate); lobes 5, spreading or incurved. Stamens 5, included; anthers obtuse. Ovary ovoid, obovoid or globose. Capsule globose, oblong or cylindric, 5-valved; valves simple or 2-fid. Seeds angular or subglobose,

peltately attached.—Species 250.—N. Hemisphere, chiefly in hilly districts.

P. auricula Linn., *P. elatior* Jacq., *P. veris* Linn. are used medicinally in Europe.

1. **Primula reticulata** Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II, 21.—PLATE 575A.

A perennial, scapigerous herb, glabrous, slightly mealy or not. Rootstock small. Leaves very long-petioled, 5-7.5 cm. long, oblong-cordate, obtuse, crenate or doubly crenate, reticulate, glaucous beneath, petiole 10-15 cm. Scape very tall, slender, 30-40 cm. Inflorescence sometimes mealy. Bracts large, regularly placed but unequal in size, sometimes toothed, linear-oblong or lanceolate. Flowers nodding, slightly fragrant. Calyx 6-8 mm., campanulate, quite terete or 5-ribbed; calyx-lobes short, acute, recurved. Corolla yellow, tube funnel-shaped, much exserted, nearly 1.3 cm., lobes erecto-patent, small, rounded or notched.

Distribution: Central and E. Himalaya, 11,000—15,000 ft.

It is said to be poisonous to cattle; it is used externally as an anodyne (Atkinson).

Kumaon: Bishkopra, Jalkutra—.

ANAGALLIS (Tourn.) Linn.

Annual or perennial herbs usually glabrous. Leaves opposite, quite entire. Flowers red or blue (rarely white), on axillary 1-flowered peduncles; bracts 0. Calyx 5-partite; lobes shorter than the corolla, persistent. Corolla hypogynous, rotate or infundibuliform, 5-partite. Stamens 5, inserted at the base of the corolla; filaments filiform, villous. Ovary globose; ovules many, amphitropous; style simple, filiform; stigma obtuse. Capsule globose, operculately dehiscent. Seeds many, plano-convex, peltate. —Species 25.—Europe, Asia, Africa, S. America.

The genus has no characteristic medicinal property.

1. **Anagallis arvensis** Linn. Sp. Pl. (1753) 148—PLATE 575B.

Annual, branched from the base, 12.5-38 cm. high, erect or procumbent; stem and branches 4-gonous, glabrous. Leaves 1-2.5 by 0.6-1.3 cm., sessile, opposite, ovate, acute, glabrous, entire gland-dotted. Flowers axillary, solitary; peduncles 1.3-3.8 cm. long, slender, erect in flower, decurved in fruit. Calyx 6 mm. long, divided nearly to the base; segments narrow, lanceolate, acuminate, slightly shorter than the corolla. Corolla rotate, 8-13 cm. diam., blue. Filaments villous. Capsule size of a small pea, operculately dividing about the middle, the style persistent on the operculum. Seeds minute, trigonous.

Distribution: More or less throughout India.—Europe, W. Asia, and introduced into most temperate regions.

The herb cures inflammations, sores, pain in the liver and the kidney, ophthalmia, keratitis, dropsical swelling; improves eyesight; antidote to viperine poison; the juice as an errhine removes bad smell and secretion (Yunani).

It is used in cerebral affections, leprosy, hydrophobia, dropsy, epilepsy, and mania.

Formerly it was used in Europe in epilepsy, mania, hysteria, delirium, enlargement of the liver, spleen, dropsy, emaciation, stone, the plague, bites of serpents and mad animals, and in numerous other diseases.

Afrikaans: Rooimuur—; *Arabic:* Anadhasira, Anaghalis, Marijaneh, Patijaneha—; *Cape Peninsula:* Pimpernel—; *Catalan:* Murrons—; *Dutch:* Guichelheil—; *English:* Bird's Eye, Bird's-tongue, Female Pimpernel, John-go-to-bed-at-noon, Male Pimpernel, Merecrop, Orange Lily Pernel, Pimpernel, Poor Man's Weather-glass, Red Chickweed, Scarlet Pimpernel, Shepherd's Calendar, Shepherd's Clock, Shepherd's Delight, Shepherd's Dial, Shepherd's glass, Shepherd's Sundial, Shepherd's Warning, Shepherd's Watch, Sun-flower, Tom Pimpernowl, Waywort, Weather-glass, Wincopipe, Wink-a-peep—; *French:* Menuchon rouge, Menuet, Miroir du temps, Morgeline d'été, Moulon, Mouron des champs, Mouron mâle, Mouron

rouge—; *German:* Abele, Ackergauchheil, Augenbluete, Corallenbluemchen, Fachheilkraut, Faullieschen, Frauenblume, Gauchheil, Geckenheil, Gochheil, Gruchheil, Hahnentritt, Heil aller Welt, Huehnertritt, Juchhei, Katzenfuss, Kesselblume, Meyer, Muerkraut, Mutkraut, Rothe Miere, Sperlingskraut, Vernunftundverstand, Vogelkraut, Wutkraut, Leisigkraut—; *Greek:* Anagallis—; *Gujerati:* Golophuldi, Kariphuldi—; *Hindi:* Jangmani, Jonkmari—; *Italian:* Anagallide, Bellichina, Mordigallina, Morgellina—; *Kharan:* Pishshi—; *Languedoc:* Mouralious, Mourillous—; *Malta:* Blue Pimpernel, Common Pimpernel, Pimpernel, Red Pimpernel, Anagallide, Bellichina, Harira hamra, Harira cahla—; *North-Western Provinces:* Jainghani, Jonkhmari—; *Persian:* Anadhasira, Anaghalis, Marijaneh, Patijaneha—; *Portuguese:* Pimpinella—; *Punjab:* Dhabbar—; *Roumanian:* Intita, Ochisor, Scanteiuta—; *Russia:* Kuroslyepnik—; *Spanish:* Anagalide, Murage—; *Urdu:* Anaghalis—.

MYRSINACEAE.

Trees or shrubs sometimes climbing. Leaves alternate, simple, usually gland-dotted; stipules 0. Flowers small, often with resinous glands, regular, hermaphrodite or polygamous-dioecious. Calyx free (in MAESA more or less adnate to the ovary), 4-6- (usually 5-) fid or partite; segments usually ciliate and persistent. Corolla usually gamopetalous, rotate (rarely campanulate or tubular); segments or petals 4-6 (very rarely 3 or 7), usually contorted or imbricate (rarely valvate). Stamens opposite the corolla-lobes and isomerous with them; filaments short (rarely elongate), free or more or less connate with one another; anthers attached at the back near the base, dehiscing by longitudinal slits (very rarely by pores). Ovary globose or ovoid, superior (in MAESA ½-inferior), 1-celled, usually attenuated into the style; ovules few or many, on a free central usually globose placenta; style simple; stigma acute, truncate or capitate (rarely shortly lobed). Fruit usually pisiform, 1- or few- or rarely many-seeded, indehiscent (except in AEGICERAS), often subbaccate and

coloured, 1-many-seeded. Seeds usually globose, excavated at the base; albumen fleshy or horny, smooth or ruminate (0 in AEGICERAS); embryo transverse.—Genera 35. Species 1,000.—Tropics and subtropics, S. Africa, New Zealand.

A. Calyx nearly enclosing the many-seeded berry
    Calyx bibracteolate. Flowers racemed .... MAESA.
B. Calyx free, staminodes absent. Fruit 1-seeded
  I. Corolla-lobes imbricate or induplicate-valvate, rarely contorted in bud
    a. Flowers in axillary fascicles. Corolla imbricate .... MYRSINE.
    b. Flowers racemed or panicled. Corolla imbricate or contorted .... EMBELIA.
  II. Corolla-lobes contorted in the bud
    Corolla-segments twisted to the right. Calyx glabrous ... ARDISIA,

The fruit and seeds are refrigerant, febrifuge, emetic, cathartic, and anthelmintic.

Embelin—2:5-dihydroxy-3-lauryl-p-benzoquinone—has been isolated from the dried fruit of *Embelia ribes* Burm. and *E. robusta* Roxb.

MYRSINE Linn.

Trees or shrubs usually glabrous. Leaves coriaceous, usually entire. Flowers small, sessile or shortly pedicellate, polygamous or often dioecious, in sessile or shortly pedunculate axillary fascicles; bracts often imbricate, deciduous. Calyx small, 4-5-fid, persistent. Corolla 4-5- partite or -petalled, white; segments spreading, imbricate (rarely valvate), not contorted in bud, resinous-dotted. Stamens 4-5, inserted at the base of the corolla-lobes; anthers short. Ovary free, globose or ovoid, 1-celled; ovules few or many, immersed in the placenta; style short or almost obsolete; stigmas 2-5, erect or spreading, sometimes sessile. Fruit small, globose, dry or subfleshy, red or purple. Seeds solitary; albumen more or less pitted, scarcely ruminate; embryo elongate, cylindric, often curved or sigmoid.—Species 147.—Tropics and subtropics.

M. africana Linn. is used medicinally in Bechuanaland.

1. **Myrsine africana** Linn. Sp. Pl. (1753) 196.—PLATE 576B.

An erect evergreen shrub usually 0.6-1.2 m. high with stems up to 2 cm. diam., but occasionally up to 2.4 m. high. Bark pale brown or grey with scattered lenticels. Young shoots pubescent. Leaves 1.3-2.5 cm. long, lanceolate or obovate, sharply toothed, dotted with resinous glands when quite young, minutely puberulous on the midrib above otherwise glabrous. Petiole minute. Flowers minute, subsessile, in axillary clusters of 3-8. Anthers red at first. Drupe 5-6 mm. diam., globose, dark purple containing a single seed surrounded by purplish fleshy tissue.

Distribution: From Kashmir and the Salt Range to Nepal, 1,000—8,500 ft.—Afghanistan; Africa to the Cape and the Azores.

The fruit is used as an anthelmintic (especially for tape-worm), sold under the name of *Bebrang,* and often used as a substitute for that of *Embelia Ribes.*

It is also laxative in dropsy and colic.

The gum is a warm remedy for dysmenorrhœa.

The Chuanas and Kwenas use a decoction of the leaf as a blood purifier.

Almora: Ghani—; *Arabic:* Baibarang, Baring—; *Bashahr:* Chitring—; *Bechuana:* Thlare-sa-madi—; *Cape Peninsula:* Cape Myrtle—; *Garhwal:* Rikadalmi—; *Hazara:* Kukal—; *Jaunsar:* Banwan—; *Kashmir:* Gugil—; *Kwena:* Thlare-sa-madi—; *North-Western Provinces:* Chupra, Guvaini, Paharicha—; *Punjab:* Atulgan, Bandaru, Bebrang, Binsin, Branchu, Branti, Chachri, Gugul, Jutru, Kakhum, Karuk, Khukan, Khushin, Kokhuri, Papri, Pratshu, Shamshad, Vavarang—; *Suto:* Morokwanapheleu, Thakxisa—; *Tigré:* Ssahsso, Thahsso, Thahzoh, Zaddse—; *Tigrinia:* Zazeh, Zosso—.

EMBELIA Burm. f.

Large shrubs usually climbing. Leaves alternate, entire or toothed; petiole often margined. Flowers small, whitish, hermaphrodite or polygamous-dioecious, in axillary or terminal simple or

compound racemes or panicles. Calyx free, persistent, 4-5- fid or -partite; lobes rounded or ovate. Petals 4-5, free or slightly cohering at the base, erect-patent or reflexed, elliptic, imbricate (rarely contorted). Stamens 4-5; filaments more or less adnate to the petals, sometimes 0; anthers ovate-oblong. Ovary ovoid or globose (rarely conical-beaked); ovules few, inserted on a subglobose placenta; style short; stigma capitellate. Fruit small, globose, 1-(rarely 2-) seeded. Seeds globose, excavated at the base; albumen pitted or subruminate; embryo curved, transverse.—Species 120.—Tropics and subtropics.

1. Inflorescence both terminal and axillary. Leaves entire ...... 1. *E. ribes.*
2. Inflorescence axillary .... 2. *E. tsjeriam-cottam.*

The fruit is anthelmintic and mildly laxative.

E. concinna Baker, *E. madagascariensis* A. DC., *E. micrantha* A. DC., *E. villosa* Baker are used medicinally in Madagascar; *E. angustifolia* A. DC. is used in La Reunion, *E. kraussii* Harv. in Zululand.

1. **Embelia ribes** Burm. f. Fl. Ind. (1768) 62, t. 23.—PLATE 577.

A large scandent shrub; branches long, slender, flexible, terete, with long internodes, the bark studded with lenticels. Leaves coriaceous, 5-9 by 2-3.8 cm., elliptic or elliptic-lanceolate, shortly and obtusely acuminate, entire, glabrous on both sides, shining above, paler and somewhat silvery beneath, the whole surface covered with scattered minute reddish sunken gland (conspicuous in the young leaves), base rounded or acute; main nerves numerous, slender (more or less obscure in fresh specimens); petioles 6-16 mm. long, more or less margined, glabrous. Flowers 5-merous, numerous, small, in lax panicled racemes which are terminal and from the upper axils; branches of the panicle often 7.5-10 cm. long with more or less glandular-pubescent rhachises; pedicels 1.5-2 mm. long, glandular-pubescent; bracts minute, setaceous, deciduous. Calyx about 1.25 mm. long; sepals connate about $1/3$ of the way up, the teeth 5, broadly triangular-ovate, ciliate. Petals 5, greenish yellow, free, 4 mm. long, elliptic, subobtuse, pubescent on both sides. Stamens 5, shorter than the petals, erect; filaments inserted a little below the middle of the

petals. Fruit globose, 3-4 mm. diam., smooth, succulent, black when ripe, like a peppercorn when dried, tipped with the persistent style.

Distribution: Throughout India, Ceylon.—Malaya, S. China.

The fruit is hot, dry, with a sharp bitter taste; good appetiser; carminative, anthelmintic, alexiteric, laxative, alterative; cures tumours, ascites, bronchitis, mental diseases, dyspnæa, diseases of the heart, urinary discharges; used in snake-bite, jaundice, hemicrania, worms in wounds (Ayurveda).

The fruit is bitter; good for plethoric constitutions; analgesic, purgative, vulnerary, anthelmintic; cures bronchitis by thickening phlegm and drying it; dries discharges from wounds; reddens the urine; removes bad humours from the body (Yunani).

Sushruta describes the fruit as anthelmintic, alterative and tonic, and recommends their use along with liquorice root, for the purpose of strengthening the body and preventing the effects of age. Later writers regard it as carminative, stomachic, anthelmintic, and useful against intestinal worms, dyspepsia, and skin diseases. The berries enter into the composition of several applications for ringworm and other skin diseases.

The Hakims consider it to be attenuant and a purgative of phlegmatic humors; also a valuable anthelmintic, especially against tape-worms.

Vaivarang is common in the neighbourhood of Bombay, and is in high repute as an anthelmintic among the country people especially in cases of tape-worm. The dose is a tea-spoonful of the powder, twice a day for a child, and a dessert-spoonful for an adult; it can hardly be called a purgative; the taste is rather pleasant, slightly astringent, and faintly aromatic. The worm is expelled dead. A purgative should be given to prepare the patient for the drug. It is a common practice to put a few berries of the plant in the milk that is given to young children; they are supposed to prevent flatulence (Dymock).

180 grains (a tola) of the powdered seeds administered at bed time in curdled milk, followed by a dose of castor oil on the following

morning, has been found an efficacious remedy in tape-worm (Sakharam Arjun).

Decoctions of the root twice or thrice daily proved to be a very effective medicine during the recent influenza epidemic (*Indian Forester;* April, 1919, p. 210).

The fruit in combination with other drugs is prescribed in snake-bite (Sushruta) and scorpion-sting (Charaka, Sushruta); but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Embelia, an old Indian worm remedy, is effective against tape-worms, but has no action on roundworms, hookworms, and whipworms.—Its action against tape-worms is, most probably, due to its constituent embelic acid or embelin, which forms about 2.5 per cent to 2.7 per cent of the drug. Embelin is 2:5-dihydroxy-3-lauryl-p-benzoquinone. The action of embelin on the tape-worms has been shown both *in vitro* and *in vivo.*—Embelin is a useful and safe remedy against tape-worms (A. S. Paranjpe and G. K. Gokhale; *Arch. int. Pharm. et Ther.*, 42-II-1932).

Arabic: Baibarang, Barmak—; *Assam:* Silgilla—; *Bengal:* Bhaibirrung, Biranga—; *Bombay:* Karkannie, Vawarang—; *Canarese:* Vayuvilanga, Vidanga—; *Central Provinces:* Baibrang, Wonding—; *Gujerati:* Varading, Vavading—; *Hindi:* Baberang, Wawrung—; *Khond:* Saradi—; *Malaya:* Vishaul—; *Malayalam:* Tiruvittikanni, Vayvilankam, Vishalam—; *Marathi:* Karkannie, Waiwarang—; *Melghat:* Bhringeli—; *Nepal:* Himalcheri—; *Persian:* Birangekabali, Biranjekabuli—; *Punjab:* Babrung—; *Pushtu:* Babrang—; *Sanskrit:* Amogha, Bhasmaka, Bidanga, Chitra, Chitrabija, Chitratandula, Gahara, Gardabha, Ghosha, Jantughna, Jantunashaka, Kairala, Kapali, Kevala, Krimighna, Krimiha, Krimikantaka, Krimiripu, Krimishetru, Mogha, Mrigagamini, Pavaka, Rasayana, Shudratandula, Suchitrabija, Tandula, Tundula, Tunduliyaka, Vara, Vatari, Vella, Vidanga, Vrishanashana—; *Saora:* Potosul—; *Sinhalese:* Welambilla—; *Sylhet:* Bebrang—; *Tamil:* Kattukodi, Vayivilangam, Vellal—; *Telugu:* Vidangamu, Vilangamu, Vayivilangamu—; *Urdu:* Bavrang—; *Uriya:* Bidongo—.

2. **Embelia tsjeriam-cottam** A. DC. in Trans. Linn. Soc. XVII (1837) 131; Wight Ic. t. 1209.—*Embelia robusta* C. B. Clarke in Hook. f. Fl. Brit. Ind. III, 515 (partim non Roxb.).—PLATE 578.

A rambling shrub or small tree; branches glabrous or the very young ones sometimes rusty-tomentose. Leaves 6.3-11.5 by 3.8-5.7 cm., broadly elliptic, suddenly and shortly acuminate, gland-dotted. the margins entire or sometimes irregularly toothed, glabrous above, paler, often reddish beneath and more or less rusty-pubescent on the nerves, base rounded or subacute; main nerves slender, conspicuous beneath, with reticulate veins between; petioles 1-2 cm. long, rusty-pubescent. Flowers 5-merous, pale greenish-yellow, in axillary rusty-puberulous racemes shorter than the leaves; pedicels 3 mm. long; bracts minute, subulate. Calyx 1.5 mm. long, sepals shortly connate at the base, ovate, subacute, gland-dotted and with minutely-glandular margins. Petals free or nearly so, 3 mm. long, elliptic-oblong, subacute, puberulous and usually with a few glands outside, densely papillose inside. Filaments in the male flowers 1 mm. long; anthers not apiculate. Fruit globose, apiculate with the style, red when ripe.

Distribution: From Ceylon and the Malabar coast through Sylhet and Assam to Singapore.—Cochin-China.

The fruit is given as an anthelmintic, and internally for piles. It is sometimes used as an antispasmodic and carminative, and also in tuberculous glands of the neck.

Bombay: Ambat, Amti, Barbatti, Byebering—; *Burma:* Aipmwaynway, Eikmwenwe—; *Canarese:* Amti, Joladhanna, Vaivaling—; *Dun:* Gaia—; *Gond:* Kopadalli—; *Hindi:* Baibrang, Bayabirang, Bebrang, Bhingi—; *Khond:* Saradi—; *Konkani:* Wayuwalingiballi—; *Kurku:* Bharangeli—; *Malayalam:* Cheriyan-nattam—; *Marathi:* Ambati, Ambuti, Kokla, Waiwarung—; *Nepal:* Achal, Kalaybogoti—; *Oudh:* Bebrang—; *Uriya:* Bayibidongo, Bidongo, Krymighno, Nununta—.

MAESA Forsk.

Glabrous or pubescent shrubs sometimes more or less sarmentose; branches terete. Leaves entire, toothed, or serrate, usually pellucid-dotted. Inflorescence sometimes monstrous, the flowers replaced by

densely imbricating bracteoles; flowers 2-bracteolate beneath the calyx, small, white, hermaphrodite or sometimes 1-sexual, in axillary racemes or panicles, pedicellate; pedicels bracteate at the base. Calyx-tube adnate to the ovary; lobes 5, persistent, imbricate. Corolla shortly campanulate; lobes 5, imbricate, rounded, with inflexed tips. Stamens 5, inserted on the corolla-tube; filaments short. Ovary partially adnate to the calyx; ovules numerous on a subglobose placenta; style short; stigma small, capitate or shortly 3-5-lobed. Berry globose, of the size of a pepper-corn, usually apiculate by the persistent style, enclosed in the thickened persistent calyx, many-seeded. Seeds numerous, albuminous, angular.—Species 105.—Tropics except America.

M. trichophlebia Baker is used medicinally in Madagascar; *M. rupescens* DC. in South Africa.

1. **Maesa indica** Wall in Roxb. Fl. Ind. ed. Carey II (1824) 230 in nota.

A large much-branched shrub; twigs slender, glabrous, usually covered with numerous small lenticels. Leaves 7.5-15 by 3.8-7.5 cm., ovate-oblong or elliptic-lanceolate, acute or acuminate, regularly or irregularly serrate-dentate, thin, glabrous and shining above, glabrous or with a few scattered hairs on the nerves beneath, base usually acute; main nerves 8-10 pairs, conspicuous beneath; petiole 1.3-2.5 cm. long, glabrous or slightly hairy. Flowers very small faintly fragrant, numerous, in compound, panicled, usually glabrous racemes, pedicels filiform, 1.25-2 mm. long; bract 1 below the pedicel, narrowly ovate, acute, glabrous; bracteoles 2, about 1.25 mm. long, narrowly ovate, acute, not ciliate. Calyx 1.5 mm. long, divided rather more than ½-way down; lobes rotund-ovate, obtuse, not or sometimes faintly ciliate, glabrous on the back, marked with dark lines; tube enlarged in fruit, enclosing the berry, rugose and obscurely ribbed outside. Corolla white, 2.5 mm. long, marked with coloured lines, divided to the middle; lobes rotund-ovate, somewhat abruptly and shortly contracted at the very base and with slightly crenulate margins, spreading. Berry globose, creamy white, about 3 mm. diam., covered

almost to the apex by the persistent calyx and tipped with the short style. Seeds black.

Distribution: Throughout India.—Malaya, Africa.

The root is given in syphilis; the fruit is considered anthelmintic.

Canarese: Guddehargi, Mandane, Tanipele—; *Garhwal:* Gadchiana, Jiundali—; *Kadir:* Kiriti—; *Kumaon:* Nagapadhera—; *Malayalam:* Kiriti—; *Marathi:* Atki—; *Sinhalese:* Matabimbiya—; *Tagalog:* Caticot—; *Tamil:* Vamarai—; *Tayabas:* Calicot—.

Ardisia Sw.

Shrubs or small trees. Leaves alternate, sessile or petiolate, usually entire. Flowers usually hermaphrodite, white or rosy, in terminal or terminal and axillary (rarely altogether axillary) panicles, umbels, or corymbs. Calyx 5- (rarely 4-) lobed or partite; lobes contorted or imbricate. Corolla rotate, 5- (rarely 4-6-) partite; segments short or long, twisted to the right. Stamens 5, attached to the base of the corolla (rarely higher up); filaments short or almost 0, free, rarely elongate; anthers elongate, usually sagittate, acute, acuminate or apiculate, rarely obtuse, dehiscing introrsely and longitudinally. Ovary ovoid, pyramidal or subglobose; ovules few or many, immersed in a globose placenta; style short or elongate; stigma minute, punctiform. Fruit globose or subglobose, usually apiculate with the persistent style; endocarp crustaceous or bony. Seed solitary, globose; albumen usually horny; embryo cylindric, transverse.—Species 260.—Warm countries.

1. Leaves 23 by 5.7 cm. .... 1. *A. colorata.*
2. Leaves 15 by 5-6.3 cm. .... *A. humilis.*

A. crenata Sims., *A. hortorum* Max., *A. japonica* Bl. are used medicinally in China; *A. fuscopilosa* Baker in Madagascar.

1. **Ardisia colorata** Roxb. Hort. Beng. (1814) 16, et Fl. Ind. ed. Carey & Wall. II, 271.—Plate 576A.

Large shrub, glabrous, rarely a small tree. Leaves chartaceous, oblong-lanceolate acute or short acuminate, base cuneate; nerves 10-15 pairs sometimes prominent; 12.5-25 cm. long, 3.8-7.5 cm.

wide; petioles 1.3-2 cm. long. Panicles terminal, 10-30 cm. long, 3-pinnate, red scaly with numerous racemes of pale pink flowers about 5 mm. across. Calyx-lobes ovate subacute. Corolla-lobes ovate acute not glandular. Drupe black, 5 mm. through, globose, ribbed when dry.

Distribution: Assam and Cachar to Burma and Malay Peninsula, Nilgiris (ex Mez).—Java.

Said to be the *dan* of Ceylon, the bark of which is used as a febrifuge in fever and in diarrhœa, and also applied externally to ulcers.

2. **Ardisia humilis** Vahl Symb. Bot. III (1794) 40; Wight Ic. t. 1212.

A shrub, stems stout, cylindrical, glabrous. Leaves large, 10-23 cm., on short very stout petioles, oval or somewhat obovate-oval; much tapering to base, obtuse or subacute and often twisted at apex, very obscurely crenate, glabrous and shining, thick lateral veins oblique, not conspicuous. Flowers on stout, rather long, curved pedicels, panicle short, 5-10 cm., terminal; calyx-segments broadly oval, subacute, puberulous, corolla 16 mm. diam., lobes acute. Berry large, 16 mm., bright scarlet, pulp abundant, seed-coat fibrous.

Distribution: Throughout India, from the Himalayas to Ceylon and Singapore (not in W. and desert India).—Malaya, China.

The plant is credited with stimulant and carminative properties.

Bengal: Banjam—; *Bicol:* Butao, Malasiac—; *Burma:* Gyengmaope—; *Canarese:* Bode, Sore—; *Central Provinces:* Kantena, Mayarawa—; *Dinagat:* Panghas—; *Khond:* Bonderi—; *Malay:* Bisi—; *Malayalam:* Molakka, Kolarakku—; *Mysore:* Bodinagidda—; *Saora:* Bonktu, Kondabhogoda—; *Sinhalese:* Baludan, Lunudan—; *Tamil:* Manipudbam—; *Telugu:* Adivimayuri, Chilukarekka, Kondamayuri, Kuntena, Mayuramu—; *Uriya:* Bhuinjamu, Katspoinjo, Kauthhintia, Kudna, Kuntu, Kuntumi, Poindjo—; *Visayan:* Babagion—.

SAPOTACEAE.

Trees, less commonly shrubs, with milky juice. Leaves alternate, usually coriaceous, entire; stipules 0, or rarely small and caducous. Flowers small, regular, usually hermaphrodite, axillary; pedicels minutely bracteate or altogether ebracteate; bracteoles beneath the calyx rare. Calyx-lobes 4-8, deep, imbricate or in 2 rows with the outer valvate, persistent. Corolla gamopetalous; tube short, campanulate or urceolate (rarely elongate); lobes as many or 2-4 times as many as the calyx-lobes. Stamens inserted on the corolla-tube, as many as the corolla-lobes and opposite to them, or 2-3 times as many, 1-3-seriate; filaments usually short; anthers oblong-lanceolate, the connective often produced beyond the cells. Staminodes when present alternating with the stamens. Ovary superior, sessile, 2-8-celled; ovules solitary in each cell; style shortly conical or elongate-subulate, glabrous; stigma usually punctiform. Berry indehiscent, 1-8-seeded. Seeds ellipsoid or if more than 1 often compressed, albuminous or not; hilum long, conspicuous; testa smooth shining; radicle inferior.—Genera 35. Species 600.—Tropics.

1. Sepals 6, biseriate. Petals 6, imbricate .... ACHRAS.
2. Sepals 4, biseriate. Petals 6-12 .... BASSIA.
3. Sepals 6-8, biseriate. Petals 18-24, biseriate .... MIMUSOPS.

The bark is bitter, astringent, and antiperiodic. The members are often milky, and the juice is hard, slightly bitter and acrid.

A glucoside, mowin, has been obtained from *Bassia*.

OFFICIAL:—*Chrysophyllum Buranhem* Riedel=*C. glycyphloeum* Casaretti (Portugal).

Dichopsis Gutta Benth. (Spain).

Isonandra Gutta Hook. (Portugal).

Palaquium spp. (Belgium, France, Germany, Holland, Italy, Japan, Sweden, Switzerland, Turkey); *P. borneense* Burck. (Italy); *P. Gutta* Burck., *P. oblongifolium* Burck. (France, Italy).

Payena spp. (Belgium, Italy, Japan, Sweden, Switzerland); *P. Leerii* Bentham and Hooker (Italy).

ACHRAS Linn.

Tree with coriaceous shining leaves clustered at the ends of the branches. Flowers rather large, solitary axillary. Sepals 3+3, outer subclavate. Corolla subglobose with 6 (rarely 5) imbricate almost contorted petals half as long as the tube or longer. Stamens one opposite each petal inserted at its base alternating with petaloid staminodes. Ovary 10-12 celled. Style with small lobed stigma. Berry globose or ovoid, somewhat umbonate, 4-12-seeded. Testa hard, albumen fleshy, cotyledons large flat.—Species 1.—W. Indies, tropical America.

A. sapota Linn. is used medicinally in Cambodia, Guiana, and Brazil.

1. **Achras sapota** Linn. Sp. Pl. ed. 2 (1762) 470.—PLATE 579.

A large handsome tree with rough dark grey bark and dense crown. Leaves oblong-lanceolate or elliptic-oblong, 7.5-12.5 cm., obtuse or subacute, shining both sides with numerous very fine inconspicuous secondary nerves and petiole 1.3-2 cm. long. Flowers long-pedicelled. Fruit globose, 3.8-5 cm. diam., usually with 5 large black shining seeds, pink flesh and brownish epicarp.

Distribution: Cultivated more or less throughout India.—A native of S. America.

In the Konkan, the fruit soaked in melted butter all night and eaten in the morning, is considered to be an excellent preventive against biliousness and febrile attacks.

In the West Indies, the seeds are known to be aperient and diuretic, and the bark is reputed to be tonic and febrifuge.

In Guiana, the bark is used as a tonic and antipyretic, the seed as a diuretic.

In Cambodia, the bark is considered astringent and febrifuge. The decoction is given in diarrhœa and in paludism.

Bengal: Sapota—; *Bombay:* Chikali—; *Brazil:* Sapote—; *Burma:* Twottapat—; *Cambodia:* Lomouth—; *Canarese:* Sapote—;

Cuba: Mamey colorado—; *Deccan:* Chakchakotikajhar—; *English:* American Bully, Australian Cranberry, Bully Tree, Mazeberry, Naseberry, Neesberry, Rough Chaff, Sapodilla, Sapodilla Plum, Sapota Plum—; *French:* Bois de chair, Bois de natte, Néflier d'Amérique, Sapotille, Sapotillier, Sapotillier cultivé:—; *French Guiana:* Sapotille—; *Guadeloupe:* Grosse sapote—; *Hindi:* Sapota—; *Jamaica:* Mammée sapota—; *Java:* Sawoe manila—; *Konkani:* Chicu—; *Madras:* Sapota—; *Martinique:* Sapote ă créme—; *Mexico:* Zapote blanco—; *Philippines:* Chico—; *Porto Rico:* Mamey sapote—; *Portuguese:* Chicu—; *Tagalog:* Tsicu—; *Tamil:* Simaiyiluppai—; *Telugu:* Sapotasima, Simaippa—; *Uriya:* Sopato—; *West Indies:* Sapotillo, Zapote—.

Bassia Koenig ex Linn.

Trees with milky juice. Leaves coriaceous, clustered near the ends of the branches; stipules caducous. Flowers fascicled, crowded near the apices of the branches among the leaves, or from the axils of fallen leaves, pedicellate, often nodding. Calyx-segments 4, much imbricate, 2-seriate, the 2 outer enclosing the 2 inner. Corolla campanulate; tube broad; lobes 6-12, erect, subcontorted in bud. Stamens at least twice as many as the corolla-lobes, 12-40 (usually 16-20); filaments usually short; anthers lanceolate, acute, the connective often produced, staminodes 0. Ovary usually villous, 4-12-celled; style subulate, often elongate. Berry globose or ovoid, fleshy, 1-3- (rarely 4-5-) seeded. Seeds ellipsoid, more or less compressed; testa crustaceous, shining; hilum long, oblong or linear; albumen 0; cotyledons thick, fleshy; radicle very short.—Species 50. —Indo-Malaya, Australia.

A. Calyx-lobes 4, the 2 outer subvalvate including the others
- 1. Pedicels stout, fulvous-tomentose .... 1. *B. latifolia.*
- 2. Pedicels glabrous, slender, up to 6.3 cm. long .... 2. *B. longifolia.*
- 3. Pedicels moderately stout, 13-20 mm. long .... 4. *B. malabarica.*

B. Calyx-lobes 5, much imbricated .... 3. *B. butyracea.*

The bark is astringent.

1. **Bassia latifolia** Roxb. Corom. Pl. I (1795) 20, t. 19.—PLATE 580.

A deciduous tree reaching 12-15 m. high; bark thick, dark coloured, cracked, the inner bark red, milky; trunk short; branches numerous, spreading, forming a thick shady head. Leaves clustered near the ends of the branches 7.5-23 by 3.8-11.5 cm., coriaceous, hard and firm, elliptic or elliptic-oblong, shortly acuminate, pubescent or tomentose when young, at length glabrous, base rounded or acute; main nerves 10-14 pairs, 6-13 mm. (or in large leaves 2 cm.) apart, with closely reticulate veins between; petioles 2.5-3.8 cm. long, at first pubescent, ultimately glabrous or nearly so; stipules 6-10 mm. long, subulate, densely pubescent, very caducous. Flowers in dense fascicles near the ends of the branches, below the terminal leaf-bud; pedicels 2.5-3.8 cm. long, drooping, fulvous- or rusty- pubescent or -tomentose. Calyx 1.6 cm. long, divided nearly to the base; segments ovate, subacute, rusty-tomentose usually 4 (rarely 5), the two outer subvalvate and enclosing the others. Corolla cream-coloured, rather more than 1.3 cm. long; tube 8 mm. long, fleshy, rugose when dry; lobes 7-14 (usually 8-9), ovate-lanceolate, acute, erect. Stamens 20-30 (usually 24-26); anthers in 3 series, acuminate, hairy at the back. Ovary hirsute; style 2.5 cm. long or more, hairy at the base. Berry 2.5-5 cm. long, fleshy, ovoid, greenish. Seeds 1-4.

Distribution: Oudh, Burma, Central Provinces, Central India, Gujarat, Konkan, N. Kanara, S. M. Country, Deccan, cultivated and self-sown.

The plant is sweet, acrid, bitter; cooling, fattening, aphrodisiac, anthelmintic; cures biliousness, burning sensation, ulcers, fatigue; causes "kapha".—The bark heals wounds and ulcers; cures leprosy; used in fractures.—The milky juice from the bark is astringent; hastens suppuration; cures "kapha" and rheumatism.—The flower is sweet and cooling, oleagenous; aphrodisiac; good in diseases of the heart; cures burning sensation, biliousness, ear complaints.—The fruit is cooling; indigestible, aphrodisiac, oleagenous, sweet, tonic; bad in diseases of the heart; cures diseases of the blood, "vata", thirst, bronchitis, consumption.—The oil is sweet, acrid; cures "kapha", bilious fevers, burning sensation (Ayurveda).

The flower is sweet with a bad smell; galactagogue, aphrodisiac, expectorant, carminative.—The seeds are galactagogue. The oil is emollient (Yunani).

The bark is used in decoction as an astringent and tonic.

It is sometimes used as a remedy for rheumatic affections. It is rubbed on the body as a cure for itch.

The leaves are boiled in water, and given as a cure for several diseases; they make a good embrocation.

The flowers yield a distilled spirit, which is described by Sushruta as heating, astringent, tonic and appetising. The flowers are regarded as cooling, tonic and nutritive. They enter into the composition of several mixtures of a cooling and demulcent character. They are used in coughs, in the form of a decoction.

The dried flowers are used as a fomentation, in cases of orchitis for their sedative effect.

The flowers fried in *ghee* are eaten by persons suffering from piles. This is a favourite remedy of Madrassi doctors posing as specialists in pile-cure. The Santals do not, as a rule, suffer from piles; and this is said to be due to their use of the flowers in the manner stated above (B. D. B.).

The honey from the flowers is used in the treatment of eye diseases.

The fruit is eaten. It yields, when expressed, a thick oil which is much valued by the hill-tribes in the treatment of skin diseases.

Sudborough, Watson, and Chandorkar have carried out a fairly exhaustive study of the oil from the seeds (*Journ. Ind. Inst. Sc.;* 1923). Its component fatty acids and glycerides have been further determined by Dhingra and Seth (20th Ind. Sc. Congress; Patna, 1933).

Baigas: Mahu—; *Bengal:* Banmahuva, Mahula, Mahwa, Maul—; *Bhil:* Mahura—; *Bhumij:* Mohul—; *Bombay:* Mahua, Moha, Mova—; *Burma:* Kansan—; *Canarese:* Doddippe, Halippa, Haltumbri, Hunage, Ippaya, Ippe, Ippi, Kadippe, Pokka, Sonedarakele, Udlu—; *Central Provinces:* Mhowa—; *Deccan:* Janglimoha,

Moha—; *English:* Butter Tree, Mahua Tree—; *Gond:* Irhu, Irrip, Irup—; *Gujerati:* Mahuda, Mahura—; *Hindi:* Janglimoha, Janglimohva, Mahua, Mahula, Mahwa, Maul, Mowa—; *Khond:* Irpi—; *Kolami:* Mandukum—; *Konkani:* Mohwa—; *Kumaon:* Mahwa, Mohwa—; *Kurku:* Mohu—; *Lambadi:* Mavunico—; *Malaya:* Mohul—; *Malayalam:* Irippa, Irippapu, Kattirippa, Pu, Puvuna—; *Marathi:* Maha, Mahwa, Mhowra, Moho, Mohwa, Mora, Mowda, Mowha, Ranachaippechajhada, Ranachamohachajhada—; *Mundari:* Madukam, Mandukamdaru—; *Oudh:* Janglimoha, Janglimohva, Mahua, Mahula, Mahwa, Maul Mowa—; *Persian:* Darakhtegulchakanesahrai, Gulechakan—; *Sanskrit:* Atavimadhuka, Dolaphala, Garudapu, Gudapushpa, Lodhrapushpa, Madhava, Madhu, Madhuka, Madhushthila, Madhusphuttila, Madhusrava, Madhuvara, Madhuvriksha, Madhvaga, Madhvalam, Mahadruma, Priyala, Rodhrapushpa, Tikshnasara, Vanaprastha—; *Santal:* Matkom—; *Surat:* Mahura—; *Tamil:* Iluppai, Kattiluppai, Madugam—; *Telugu:* Adaviyippa, Ippa, Madhukamu, Peddayippa—; *Tulu:* Ippe, Navildu—; *Urdu:* Mahuva—; *Uriya:* Mohuka, Mohulo—.

2. **Bassia longifolia** Linn. Mant. II, Append. (1771) 563; Wight Ill. t. 147.—PLATE 581.

A large tree; branches numerous; bark thick, dark brown, scaly, the inner dark red, milky; young parts pinkish white, silky-pubescent. Leaves thin, clustered near the ends of the branches, 7.5-12.5 by 2.5-4.5 cm., linear-lanceolate, acute, glabrous when mature, much tapered towards the base; main nerves 10-12 pairs; petioles 1.3-2 cm., long, slender; stipules 1.3 cm. long, linear-subulate, hairy, caducous. Flowers appearing with the young leaves, in dense clusters near the ends of the branches below the leaves; pedicels 3.8-6.3 cm. long, glabrous, erect at first, afterwards more or less drooping. Calyx 1-1.3 cm. long, divided nearly to the base, densely rusty-pubescent; segments usually 4, ovate-oblong, acuminate. Corolla 1.3-1.6 cm. long; tube fleshy, inflated, glabrous, rugose when dried; lobes 6-12, about as long as or a little shorter than the tube, lanceolate, subobtuse, glabrous. Stamens 16-20, in 2 rows one above the other, subsessile; anthers hairy, cordate at the base, the connective produced

to a point. Ovary densely hairy; style 2.5-2.8 cm. long. Berry oblong, the size of a plum, hirsute when young, ultimately nearly glabrous, yellowish when ripe. Seeds 1-2, compressed, straight on one side, curved on the other.

Distribution: Indigenous chiefly in the moist forests on the west side of India from the Konkan southwards to Travancore, Deccan, common in Mysore, Ceylon, cultivated in the Carnatic and Upper Burma.

It is astringent and emollient. Like *B. latifolia,* it yields two important products—a fixed concrete oil and a spirit, the former obtained by expression from the seeds, the latter by distillation from the flowers. The oil is good for skin diseases, and the flowers act as a mild laxative.

The gummy juice is used in rheumatism by Vaids. The bark in decoction as an astringent and emollient, and also as a remedy in itch.

The root, bark, leaves, and flowers are prescribed in snake-bite (Charaka, Sushruta, Vagbhata). The flowers are prescribed in scorpion-sting (Charaka, Sushruta).

The flower is not an antidote to scorpion-venom (Caius and Mhaskar) and no part of the plant is an antidote to snake-venom (Mhaskar and Caius).

The changes taking place in the composition of the fruit after it is gathered have been studied by Fowler and Dinanath (*Journ. Ind. Inst. Sc.;* 1923).

Bengal: Mohuva—; *Bombay:* Mohwa, Mohi—; *Burma:* Kanso, Kanzannu, Meze—; *Canarese:* Ippe, Huli, Movaro, Sannayippe—; *Cutch:* Mahuda—; *Deccan:* Moha—; *English:* Honey Tree, Mahua of Southern India—; *Gujerati:* Mahuda, Movanujhada—; *Hindi:* Moha: Mohua—; *Konkani:* Moi—; *Malayalam:* Irippa—; *Marathi:* Ippichajhada, Mohachajhada, Mohwa—; *Persian:* Darakhtegul-chakan—; *Sanskrit:* Madhuka—; *Sinhalese:* Mi—; *Tamil:* Iluppai, Iruppai, Kuligam, Kulisam, Madugam, Maduragam, Mavagam, Nattiluppai, Seyilam, Tittinam—; *Telugu:* Ippa, Pinnayippa, Sannayippa, Uriyippa—; *Tulu:* Ippe—.

3. **Bassia butyracea** Roxb. in As. Res. VIII, 499-502; Fl. Ind. II (1832) 527.—PLATE 582.

A medium sized deciduous tree up to 1.8 m. girth and 12 m. high. Bark dark reddish brown, fairly smooth on young stems becoming rough on old ones, exfoliating in irregular thin woody scales. Blaze 1-1.8 cm., bright pink with pinkish or yellowish bands in the outer half which turn orange on exposure, inner half rather fibrous, exuding a milky juice which turns purple on the blade of a knife. Young shoots tomentose. Leaves 20-35 by 9-15 cm., obovate, obovate-oblong or elliptic, obtuse or acute, entire, base acute, dark rather glossy green above and pubescent when young but becoming glabrous with age, clothed more or less densely with long adpressed pale hairs beneath; lateral nerves 13-18 pairs prominent beneath. Petiole 1.3-2.5 cm. long, stout, terete, rusty-pubescent. Flowers 2-2-5 cm. diam., white, with a sickly fragrance, crowded in fascicles chiefly just below the leaves and sometimes a few between the leaves. Pedicels 1.8-2.8 cm. long, curved downwards, rusty-tomentose. Corolla-tube 6 mm. long, cylindric slightly dilated upwards, somewhat thickened but not fleshy with 8-12 lobes spreading at first but soon recurved. Stamens 30-40. Berry 2-4.5 cm. long, ellipsoid, green, shining. Seeds usually 1-2.

Distribution: Sub-Himalayan tract from Kumaon to Bhutan, 1,000—5,000 ft.

It is used as an ointment in cases of rheumatism. The butter is an excellent emollient for chapped hands, etc., during the winter months.

Dehra Dun: Chiura—; *English:* Indian Butter Tree—; *French:* Arbre à beurre, Illipe—; *Hindi:* Chiura, Phalvara, Phalwara, Phulwa—; *Kumaon:* Bhulel, Chara, Chyura—; *Lepcha:* Yel, Yelpote—; *Nepal:* Chiwari, Churi—; *Oudh:* Cheuli—.

4. **Bassia malabarica** Bedd. For. Man. 140.

A middle sized tree; bark dark coloured, scaly. Leaves 7.5-20 by 2.5-5.7 cm., very coriaceous, oblong to lanceolate, subobtuse, glabrous, dark green and shining, base tapering; main nerves 15-25 pairs, very slender with closely reticulate veins between; petioles

6-13 mm. long. Flowers crowded towards the ends of the branches in dense fascicles; pedicels 1.3-2 cm. long. Calyx 9 mm. long, divided nearly to the base; segments 4, ovate, subacute, the 2 outer glabrous or nearly so, the 2 inner hairy. Corolla 1.3 cm. long, tube densely rufous-hairy both inside and outside, slightly shorter than the lobes; lobes 6 (rarely 7), oblong, obtuse, fulvous-hairy outside. Stamens 16-18 in 2 rows; filaments densely rufous-hairy; anthers glabrous or with a very small tuft of hairs between the basal lobes, cordate at the base, the connective much produced. Ovary glabrous; style 2 cm. long. Berry oblong-lanceolate, glabrous when young.

Distribution: W. Peninsula.

The flowers are soaked in water and used in kidney complaints.

The fruits are considered anthelmintic; they are given in rheumatism, biliousness, consumption, and asthma.

The oil from the seeds is used in rheumatism.

Canarese: Hulinanele, Nanale—; *Malayalam:* Attirippa—; *Tamil:* Attilappai, Vanji—.

Mimusops Linn.

Trees with milky juice. Leaves coriaceous, often with slender parallel nerves. Flowers fascicled or solitary, axillary. Calyx-segments 6-8, in 2 series, the exterior subvalvate, enclosing the interior imbricate ones. Corolla-tube short, broad; lobes 18 or 24, of which 12 or 16 are exterior and 1-2-seriate, 6 or 8 interior 1-seriate. Stamens 6 or 8, attached at the base of the corolla and opposite the lobes of its interior series; filaments short, dilated, free, or connate into a tube with the staminodes; anthers lanceolate, the connective usually produced beyond the cells; staminodes 6 or 8, subpetaloid, variously toothed or lacerate, alternate with the stamens in the same series, or connate at the base with them. Ovary hirsute, 6-8-celled. Berry globose; epicarp crustaceous. Seeds few or solitary, obliquely ovate, slightly compressed; testa crustaceous or

hard, shining; hilum small and basilar or elongate and lateral; albumen fleshy; cotyledons flat.—Species 65.—Tropics.

1. Leaves 9 by 4.5 cm. Staminodes 8 .... 1. *M. elengi.*
2. Leaves 7.5-10 by 3.8-5 cm. Staminodes 6-8 .... 2. *M. hexandra.*
3. Leaves 10 by 5 cm. Staminodes 6-8 .... 3. *M. kauki.*

The bark is tonic, astringent, and antiperiodic; the fruit is pectoral.

The following species are used medicinally in Java—*M. elengi* Linn., *M. kauki* Linn.—; in the Philippine Islands—*M. elengi* Linn.—; in Brazil—*M. subsericea* Mart.—; in North America—*M. kauki* Linn.—.

1. **Mimusops elengi** Linn. Sp. Pl. (1753) 349, 95; Wight Ic. t. 1586.—Plate 583A.

A large glabrous evergreen tree 12-15 m. high, with a compact leafy head and short erect trunk; bark smooth, scaly. Leaves 6.3-10 by 3.2-5 cm., elliptic, shortly acuminate, glabrous, base acute or rounded; petioles 1.3-2.5 cm. long. Flowers white, fragrant, nearly 2.5 cm. across, solitary or in fascicles of 2-6; buds ovoid, acute; pedicels 6-20 mm. long, appressedly pubescent, often deflexed. Calyx 1 cm. long, fulvous-pubescent; segments 8, the 4 outer ovate-lanceolate, acute, the 4 inner narrower than the outer. Corolla longer than the calyx; tube 1.5 mm. long; lobes 8 mm. long, about 24, in 2 series, the inner series of 8 the outer of 16 lobes, linear-oblong, acute. Stamens 8, opposite the inner circle of lobes; filaments short, glabrous; anthers glabrous, slightly twisted, acuminate; staminodes 8, alternate with the stamens, lanceolate, acuminate, densely clothed on the back and margins with white hairs. Ovary appressedly silky-pubescent; style grooved, slightly longer than the corolla. Berry about 2.5 cm. long, ovoid, yellow when ripe. Seed solitary, ovoid, compressed, brown, shining.

Distribution: W. Peninsula, southwards from the Khandala Ghat on the west and the N. Circars on the east side, Ceylon, Andamans, Martaban, Tenasserim, Malay Peninsula and Archipelago.

The bark is acrid and sweet; cooling, cardiotonic, alexipharmic, stomachic, anthelmintic, astringent; cures biliousness, diseases of the gums and teeth.—The flower is sweet, acrid, oleagenous; cooling, astringent to the bowels; gives taste; cures diseases of the blood.—The fruit is sweet, acrid, oleagenous; astringent to the bowels; good for the teeth; causes flatulence.—The seeds fix loose teeth; as an errhine cure troubles in the head (Ayurveda).

The root is sweet and sour; aphrodisiac, diuretic, astringent to the bowels; good for gonorrhœa; as a gargle cures relaxation of the gums.—The flowers are expectorant; cure biliousness, liver complaints, diseases of the nose, headache; their smoke is good in asthma. —The fruit and the seeds are sweet and sour; aphrodisiac, diuretic, astringent to the bowels; good in gonorrhœa (Yunani).

In the Konkan, the unripe fruit, and the fruit and flowers along with other astringents, are used to prepare a lotion for sores and wounds.

A snuff made from the dried and powdered flowers is given in a disease called Ahwah, common in Bengal. The symptoms of this disease are strong fever, headache, and pain in the neck, shoulders and other parts of the body. The powdered flowers induce a copious defluxion from the nose and relieve the pain in the head.

A water distilled from the flowers is in use amongst the natives of Southern India, both as a stimulant medicine and as a perfume.

The pulp of the ripe fruit is sweetish and astringent and has been successfully used in curing chronic dysentery.

The bruised seeds are applied locally within the anus of children in cases of constipation.

The bark has astringent tonic properties. It is much esteemed by the Javanese, and is stated to have proved useful in fevers, and as a general tonic.

The leaf is one of Sushruta's snake remedies. In practice about half a teaspoonful of the expressed juice of the fresh leaves is poured into the nostrils in stupor and coma (Roberts). The leaf is not an antidote to sanke-venom (Mhaskar and Caius).

The kernel yields an oil which has been examined for its physical and chemical characters (A. K. Menon).

Bengal: Bakal, Bakul, Bohl, Bukal—; *Bombay:* Borsali—; *Burma:* Kaya, Khaya—; *Canarese:* Bakula, Buckhul, Bukul, Kalhale, Kesara, Mugule, Okula, Pagade, Ranjal, Renji, Vakula—; *Central Provinces:* Bholsari, Gholsari—; *Ceylon:* Makil, Mukalai, Vilvapattiri—; *Gujerati:* Baphuli, Bolsari, Borasalli, Borsali, Varsoli, Vovoli—; *Hindi:* Bakul, Bolsari, Maulsarau, Maulser, Mulsari—; *Java:* Tandjoeng—; *Konkani:* Vonvol, Vouvoly—; *Malayalam:* Bakulam, Elengi, Ilanni, Iranni, Makuram—; *Marathi:* Bakhor, Bakula, Barsoli, Ovalli, Owli, Vavoli, Wovali, Wowli—; *Meywar:* Barsoli—; *Mundari:* Baurdaru—; *North-Western Provinces:* Maulsari—; *Porebunder:* Varsadi—; *Punjab:* Maulsari, Maulsiri—; *Sanskrit:* Anangaka, Bakula, Chirapushpa, Dhanvi, Dohala, Gudhapushpaka, Kantha, Karuka, Keshara, Madhupanjara, Madhupushpa, Mukula, Padyamoda, Sharadika, Sidhugandha, Sindhugandha, Simhakesara, Sinhakesara, Sthirakusuma, Strimukhagandha, Strimukhamadhu, Surabhi, Tailanga, Varalahdha, Visharada—; *Saora:* Pal—; *Sinhalese:* Munemal—; *Tagalog:* Bansalague, Bansalagui, Bansalagon, Barsic, Cabiqui, Pasac—; *Tamil:* Alagu, Ilanji, Kesaram, Kosaram, Magil, Magilam, Vagulam—; *Telugu:* Kesara, Nemmi, Nunni, Parijatamu, Pogada, Vakulamu—; *Urdu:* Molsari—; *Uriya:* Bokulo, Boulo, Khyiri—; *Visayan:* Bansalague, Bansalagon, Cabiqui, Talipopo—; *Zambales:* Pasac—.

2. **Mimusops hexandra** Roxb. Corom. Pl. I (1795) 16, t. 15.—PLATE 584.

A large evergreen glabrous tree 15-18 m. high, with a shady head; trunk erect without branches for a considerable height; bark blackish grey, deeply furrowed. Leaves coriaceous, 5-11.5 by 2.5-5 cm., obovate or oblong, rounded or emarginate at the apex, glabrous on both sides, dark green and polished above, paler beneath, base acute; main nerves 12-20 pairs, not conspicuous; petioles 1-1.3 cm. long, channelled above, glabrous. Flowers whitish, axillary, solitary or in fascicles of 2-6; pedicels 6-13 mm. long, glabrous or nearly so. Calyx rusty-tomentose outside; segments 6, reflexed, ovate, subacute, 4 mm. long, the 3 inner rather narrower than the 3 outer, ciliate. Corolla-tube 1.25 mm. long; lobes usually 18, about 4 mm.

long, 2-seriate, the 6 inner oblanceolate, shortly clawed, a little longer or almost equal to the outer, the 12 outer linear, acute. Stamens 6; filaments as long as the acute (not acuminate) anthers; staminodes 6, alternate with the stamens, bifid or denticulate at the apex, glabrous. Ovary silky-pubescent, 12-celled. Berry usually 1- (rarely 2-) seeded, of the size and shape of an olive, reddish yellow when ripe. Seed ovoid reddish brown, shining.

Distribution: Upper Gangetic Plain, Central and S. India, Gujarat, Khandesh, Deccan, Sriharikota, Ceylon.

The fruit is sweet, oleagenous; cooling, indigestible, tonic, aphrodisiac; allays thirst; good for the heart; cures biliousness, "tridosha", consumption, hallucinations, loss of consciousness; useful in leprosy.—An extract of the leaves is given for vaginal discharges (Ayurveda).

The bark is aphrodisiac.—The fruit is milky, sweet and sour; tonic to the body and the heart, aphrodisiac; appetiser; good for old people; lessens heaviness of the head, thirst; brings back consciousness; cures vomiting, bronchitis, gleet, urinary discharges.—The seeds cure ulcers, and opacities in the cornea (Yunani).

The bark is used medicinally in the same way as that of *M. elengi.*

C. K. Patel has carried out a fairly exhaustive study of the oil from the seeds (*Journ. Ind. Inst. Sc.;* 1924).

Annam: Cay gang, Cay viet—; *Andamans:* Dogota—; *Bengal:* Khirkhejur—; *Bombay:* Kerni, Rajan, Rayani—; *Canarese:* Bakula—; *Gond:* Raini—; *Gujerati:* Kaira, Khirni, Ran, Rankokari, Rayan, Rayani—; *Hindi:* Khir, Khirni, Kshiri, Ranjan—; *Malayalam:* Pala—; *Marathi:* Raini, Rajana, Ranjana, Rayan—; *North-Western Provinces:* Khirni—; *Porebunder:* Ran—; *Sanskrit:* Dhupeshtha, Dridhaskandha, Guchhaphala, Kapishtha, Kshirashukla, Kshiravriksha, Kshiri, Kshirika, Kshirini, Madhavodbhava, Madhuphala, Nimbabija, Nripadruma, Phaladhyaksha, Rajadana, Rajadani, Rajanya, Rajaphala, Rajavallabha, Shriphala—; *Sinhalese:* Palu—; *Tamil:* Pala, Palai, Sivandi, Sivani, Sukkilam, Ulakkaippalai—; *Telugu:* Manjipala, Nemmi, Nunni, Pala—; *Urdu:* Khirani—; *Uriya:* Khiakhyiri, Khyiri, Rajono—.

3. **Mimusops kauki** Linn. Sp. Pl. (1753) 349.—Plate 583B.

Large spreading tree with coriaceous leaves, obovate or elliptic blunt, white silky beneath, 10 cm. long, 6.3 cm. wide; petioles 3.8 cm. long. Flowers on thick pedicels. Sepals 6 mm. long, ovate acute, silky. Corolla-lobes 18 in 2 rows. Stamens usually 6; staminodes fimbriate. Fruit ovoid-oblong, over 2.5 cm. long, 2-4-seeded, orange-red.

Distribution: A native of the Malay Peninsula and Archipelago; occasionally planted in Indian gardens.

The root and bark are believed to be astringent and are given in infantile diarrhœa, after being ground with water and mixed with honey. The leaves, boiled in gingelly oil and added to the pulverised bark, are considered a good remedy in Beri-beri.

The leaves, ground and mixed with turmeric and ginger, are used as cataplasms for tumors.

The milk of the tree is used in inflammation of the ear and in conjunctivitis.

The seeds made into powder are used in ophthalmia; they are employed internally as a tonic and febrifuge, and prescribed in leprosy, thirst, delirium and disorders of the many secretions. They are also considered anthelmintic.

Annam: Phle mut—; *Bombay:* Khirni—; *Canarese:* Hadari, Hale, Nemi, Pale, Patali—; *Goa:* Poma d'Adao—; *Hindi:* Khirni—; *Java:* Kitjik, Pohon, Sawoe, Sawoe djawa, Sawoe betawi—; *Konkani:* Adaoruc—; *Malaya:* Buasau—; *Malayalam:* Manilakkara, Palamunippala—; *Marathi:* Kauki—; *Portuguese:* Arvore de Adao—; *Punjab:* Khirni—; *Sanskrit:* Talavrinta, Vasantaduti—; *Tamil:* Palai—; *Tulu:* Pale, Patali—.

EBENACEAE.

Trees or shrubs; wood often hard and heavy, sometimes black in the centre; juice not milky. Leaves alternate (rarely opposite), entire, usually coriaceous; stipules 0. Flowers usually dioecious.

axillary, cymose or solitary, usually bracteate; pedicels articulated under the flower. Calyx inferior, gamosepalous, often accrescent in fruit; lobes 3-7. Corolla gamopetalous; lobes 3-7, usually contorted, twisting to the right. Male flowers: Stamens as many or 2-3-times as many as the corolla-lobes or indefinite, usually hypogynous, filaments free or paired or variously connate; anthers narrow, erect, basifixed, dehiscing longitudinally (rarely by an apical pore), often apiculate by the produced connective, often hairy. Ovary rudimentary or 0. Female flowers: Staminodes usually fewer than the stamens of the male flowers or 0. Ovary superior, sessile; styles 2-8, free or more or less connate into a 2-8-fid style; cells as many or twice as many as the styles, imperfectly septate; ovules twice as many as the styles, attached to the inner angle of the cells, pendulous, anatropous. Fruit coriaceous or fleshy, indehiscent, 1- or few- seeded. Seeds pendulous, usually oblong, more or less compressed, longitudinally 2-3-furrowed; testa thin or coriaceous, smooth; albumen copious, uniform or ruminate; embryo axile; radicle superior.—Genera 7. Species 320.—Tropics, especially Indo-Malaya.

The Order exhibits astringent, antipyretic, and anthelmintic properties.

DIOSPYROS Linn.

Trees or shrubs. Leaves alternate (rarely subopposite). Flowers dioecious (rarely polygamous), in cymes which are axillary or along the old branches, sometimes (the females often) reduced to a single flower. Calyx gamosepalous, 3-7- (usually 4-5-) fid or partite, pubescent and often accrescent beneath the fruit, rarely truncate. Corolla urceolate, tubular, campanulate or hypocrateriform, more or less pubescent outside; lobes 3-7 (usually 4-5), twisted to the right. Male flowers: Stamens 4-many (usually 16), attached to the base of the corolla or hypogynous; filaments in pairs, or variously connate, or free; anthers linear or lanceolate. Ovary rudimentary or 0. Female flowers: Staminodes 0-16. Ovary conical or globose, 4-10-celled; ovules solitary (rarely 2) in each

cell; styles or style-branches 1-4. Fruit globose, ellipsoid or ovoid-conic, usually supported by the enlarged calyx; the flesh often pulpose or viscid.—Species 240.—Warm countries.

1.	Leaves ovate or oblong, pubescent or glabrous, base cuneate or obtuse	1. *D. montana.*
2.	Leaves elliptic, narrowed upwards, membranous, at first pubescent	4. *D. lotus.*
3.	Leaves oblong-obtuse, at the base glabrous	2. *D. peregrina.*
4.	Leaves elliptic, obtuse or obtusely cuneate at both ends	6. *D. ebenum.*
5.	Leaves elliptic, narrowed at both ends	3. *D. melanoxylon.*
6.	Leaves oblong, shortly cuneate at both ends, coriaceous, glabrescent	5. *D. candolleana.*
7.	Leaves broad-oblong, obtusely cuneate at both ends, glabrous	7. *D. paniculata.*

The bark is bitter, astringent, and febrifuge. The unripe fruit is a powerful astringent.

The following species are used medicinally in China—*D. kaki* Linn. f., *D. lotus* Linn., *D. peregrina* Guerke—; in Cambodia—*D. decandra* Lour.—; in Malaya—*D. kaki* Linn. f., *D. lotus* Linn.—; in Mauritius—*D. leucomelas* Poir., *D. melanoxylon* Roxb., *D. tesselaria* Poir.—; in Madagascar—*D. megasepala* Baker, *D. perrieri* Jum.—; in North America—*D. virginiana* Linn.—; in Guiana and North Brazil—*D. paralea* Steud.—; in Guinea—*D. mespiliformis* Hochst.—.

D. xanthochlamys Guerke is sometimes used as a fish poison in the Gold Coast.

Mannose-yielding compounds have been obtained from the seeds of *D. kaki.*

1. **Diospyros montana** Roxb. Corom. Pl. I (1795) 37, t. 48; Wight Ic. t. 1225.—PLATE 585.

A small tree with rather slender stem and smooth grey bark; young shoots glabrous or pubescent. Leaves alternate, 3.8-14 by 2.5-7.5 cm., ovate-oblong or elliptic, acute or subacuminate, base usually rounded, softly pubescent or tomentose when young ultimately glabrescent; petioles 2.5-7.5 mm. long. Male flowers 1 cm. long, in 3-5-several-flowered cymes; peduncles 5-13 mm. long; pedicels very short. Calyx 5 mm. long, cleft $^{2}/_{3}$ of the way down; lobes ovate,

acute, ciliate, suberect. Corolla urceolate, glabrous, cleft $1/2$ down; lobes oblong, obtuse. Stamens 16, in two series of 8, the inner stamens shorter than the outer, opposite to them and connate with them into pairs; anthers lanceolate, awned, glabrous, half exserted. Female flowers 1.3 cm. long, 2 cm. across the calyx, solitary peduncles 3.7-7.5 mm. long, nodding. Calyx 1.3 cm. long, puberulous, cleft $^2/_3$ the way down; lobes elliptic, obtuse, ciliate. Corolla slightly larger than in the male. Staminodes 2, 4 or 8 in one series. Ovary 8-celled, glabrous; styles 4, bifid. Fruit up to 2.5 cm. diam., globose, reddish brown when ripe. Seeds with uniform albumen.

Distribution: Throughout India, Ceylon.—Malaya, tropical Australia.

The fruit is supposed to be poisonous. The bhistis apply it to boils which generally appear on their hands and give them much pain and trouble (Stewart).

The Mundas of Chota Nagpur use the crushed leaves to poison fish.

Banda: Makartendi—; *Banswara:* Ambia—; *Bengal:* Bangab—; *Bhurtpur:* Pasend—; *Bombay:* Goindu, Hadru, Kundu, Temru—; *Burma:* Chok, Gyutbeng, Taubot—; *Canarese:* Balkunike, Bulguni, Jagalugante, Kadubalekayi, Kalagunda, Tendu, Vankane—; *Central Provinces:* Kadal, Kanchan, Pattewar, Patwan—; *Ceylon:* Katukanni, Mulkarunkali, Vakkana, Vukkana—; *English:* Mottled Ebony—; *Gujerati:* Timbaroa, Timru—; *Hasada:* Haradaru—; *Hindi:* Bistendu, Dasaundu, Lohari, Tendu—; *Kanara:* Tendu—; *Konkan:* Goinda—; *Malayalam:* Bali—; *Malkot:* Pinna—; *Marathi:* Goindu, Goundhan, Govindu, Lohari, Tembhurni, Timburni, Timru—; *Meywar:* Temru—; *Naguri:* Sakamhara—; *Palampur:* Timbaroa, Timru—; *Panch Mahals:* Hadru, Temra, Timra—; *Punjab:* Hirek, Kendu, Pasendu, Temru—; *Sanskrit:* Tumala—; *Santal:* Gadaterel—; *Saora:* Palbungi—; *Sinhalese:* Kethikanni—; *Tamil:* Vakkanai, Vakkanattan, Vellaittuvarai, Velvakkanai—; *Telugu:* Eddayagata, Gatugata, Kakavulimidi, Muchitumiki, Makha, Nallavulimidi, Pudumaddi—; *Uriya:* Bhodrika, Gourokoshayo, Koshakholi—.

2. **Diospyros peregrina** Gürke in Engl. & Prantl Nat. Pflanzenf. IV, I, 164.—*D. embryopteris* Pers. Syn. II (1807) 624. —*Embryopteris glutenifera* Roxb. Corom. Pl. t. 70; Wight Ic. tt. 843, 844.—PLATE 586 (under *D. embryopteris* Pers.).

A small or middle sized tree, glabrous except the very young parts and the inflorescence; branches numerous, spreading, forming a dense shady head; bark smooth, thick, blackish, flaking off in large pieces. Leaves variable in size, numerous, distichously spreading, coriaceous, 10-28 by 2.5-9 cm., oblong or oblong-lanceolate, obtuse or subacute, glabrous and shining, reticulately veined, the veins prominent in dried specimens, obscure in fresh ones, base usually tapering; petioles 1-2 cm. long, stout, wrinkled. Male flowers in shortly peduncled, fulvous-pubescent, racemose, axillary, drooping cymes containing 2-7 flowers. Calyx 6 mm. long, hairy outside; lobes 4, broadly ovate, 4 mm. long, pubescent inside and with ciliate margins. Corolla 1 cm. long; lobes 3-4 mm. long, very thick, rounded at the apex and with a pubescent patch on the back of each lobe, imbricate. Stamens 24-64 (usually 40) in pairs, inserted at the base of the corolla-tube or on the receptacle beneath it; filaments hairy, about 2.5 mm. long; anthers 6 mm. long, nearly equal linear, with a line of hairs up the middle. Rudimentary ovary a lobed fleshy disk. Female flowers larger than the male, 2.5 cm. across, usually solitary, axillary, drooping; pedicels very short. Calyx deeply divided, glabrous or pubescent; segments 4, erect, broadly ovate, acute, dilated and subcordate at the base. Corolla 1.3 cm. long, campanulate, deeply divided; lobes 4, cordate, obtuse, recurved. Staminodes 1-12, hairy, usually inserted at the base of the corolla-tube (sometimes perhaps true stamens). Ovary glabrous or hairy, 8-celled; styles 4; stigmas lobed and undulate. Fruit large, 3.8-7.5 cm. diam., usually solitary, subglobose, yellow, covered with a rusty easily detachable scurfiness, 8-celled, supported on the much enlarged persistent spreading or reflexed calyx; pericarp thin; pulp viscid and glutinous. Seeds 4-8, flattened, smooth, reddish brown.

Distribution: Throughout India, Ceylon.—Siam, Malay Archipelago.

The unripe fruit is acrid, bitter; oleagenous, heating, indigestible, astringent to the bowels; cures ulcers and " vata ".—The ripe fruit

is sweetish, oleagenous; cures biliousness, diseases of the blood, urinary losses, and stone in the urinary tract.—The flowers and fruit are given in the hiccough of children.—The bark is good for dysentery.—The wood cures biliousness (Ayurveda).

The flowers are aphrodisiac; good for lumbago; used in biliousness and diseases of the blood.—The fruit is sweetish; aphrodisiac, tonic (Yunani).

The fruit and the bark possess astringent properties. The juice of the unripe fruit makes a good application to fresh wounds. It is full of tannin, and is therefore a useful domestic astringent, so plentiful as to be at the door of even the poorest hut. An oil extracted from the seeds is also used in native medicine, in dysentery and diarrhœa with success. The bark is used in intermittent fevers (Honigberger).

It is used in dysentery and diarrhœa with success. The infusion of the fruit is used as a gargle in aphthæ and sore throat.

The seeds are preserved by the country people, and given as an astringent in diarrhœa.

In snake-bite Charaka recommends the juice of the bark and leaves, together with the juice of the root of *Albizzia Lebbek.* A few drops are poured in the eyes as a collyrium, and in the nostrils as an errhine.

The bark and the leaves are useless as a collyrium and an errhine in the treatment of snake-bite (Mhaskar and Caius).

Arabic: Abnusehindi—; *Assam:* Kendu—; *Banda:* Kusi—; *Bengal:* Gab, Makurkendi, Tendu—; *Bombay:* Gab, Kusi, Tendu, Timbiri, Timbori, Zeeberwo—; *Bundelkhand:* Kusi—; *Canarese:* Antina, Banda, Gavandu, Hagna, Haine, Higebanda, Holetupare, Hulitumri, Kakutupare, Kusharta, Kusure, Olletupare, Tapasi, Tubare, Tumaki, Tumari, Tumburu, Tupare—; *Ceylon:* Panichekai, Tumbika—; *Chinese:* Pei shih—; *Coorg:* Holetupare—; *English:* Riber Ebony—; *Gujerati:* Zeeberwo—; *Hindi:* Gab, Kalatendu, Makurkendi, Tendu—; *Khandesh:* Tembhuran—; *Khond:* Titia—; *Malayalam:* Panachi, Vananji—; *Marathi:* Temburni, Timburi, Timbwini—; *Mundari:* Gorakindu, Kindu—; *Persian:* Abnusehindi—; *Reddi:* Muttiatumiki—; *Sadani:* Makarkend—; *Sanskrit:*

Anilsara, Atimuktaka, Dantasatha, Kalaskandha, Kendu, Krishnasara, Krishnatvaka, Nilasara, Rava, Ravana, Shitisaraka, Sphurjaka, Sphurjana, Srishta, Susara, Svaryaka, Syandana, Syandanavhaya, Tinduka, Tinduki, Tindula, Tuvara, Virupaka—; *Santal:* Makarkenda—; *Saora:* Erutumiki, Nirutumiki, Nititumiki—; *Sinhalese:* Timbiri—; *Tagalog:* Talanggubat—; *Tamil:* Kattatti, Kavikattai, Panichai, Pattuppallam, Tumbi, Tuvarai—; *Telugu:* Elosu, Etitummika, Gabu, Nilitumiki, Tinduki, Tubiki, Tumiki, Tummika—; *Tulu:* Banda—; *Urdu:* Tindu—; *Uriya:* Dhusarokendu, Kendu—.

3. **Diospyros melanoxylon** Roxb. Corom. Pl. I (1795) 36, t. 46.—*D. tomentosa* Roxb. Hort. Beng. 40; Wight Ic. tt. 182, 183 (non Poir.).—PLATE 587A.

A middle sized deciduous tree reaching 15 m. in height; bark dark grey or black, exfoliating in rectangular scales; young parts and inflorescence clothed with grey or tawny tomentum. Leaves 6.3-15 by 2.5-7 cm., alternate or subopposite, coriaceous, elliptic or elliptic-oblong, obtuse or subacute, softly tawny-tomentose on both sides when young, glabrous above and pubescent beneath when mature, base usually acute, rarely rounded; main nerves 6-10 pairs with reticulate veins between; petioles 6-8 mm. long. Male flowers 4-6-merous, 3-12 together, in tawny-tomentose panicled drooping cymes longer than the petioles. Calyx campanulate, 4-6 mm. long, hairy on both sides; lobes 4-6, shorter than the tube, subacute. Corolla more or less tubular, about twice as long as the calyx, pubescent outside, glabrous inside; lobes 4-6, broadly ovate, acute, about 3 mm. long. Stamens 12-16 (in pairs when 16); anthers linear-oblong, acuminate. Female flowers rather longer than the male, solitary, subsessile, 4-5-merous. Calyx hairy on both sides, 4-5-gonal. Corolla as in the male. Staminodes 8-10. Ovary densely hairy, 4-8-celled; ovule solitary in each cell; styles 2, bifid. Fruit yellow when ripe, ovoid or globose, 2.5-3.2 cm. long; fruiting calyx thickly coriaceous, nearly flat, the lobes undulate, often with reflexed margins. Seeds 2-8, compressed, oblong; testa rugose, shining; albumen ruminate.

Distribution: Deciduous forests of the Central Provinces, Chota Nagpur, Bihar, W. Peninsula, Ceylon.

The fruit is bitter, acrid; cooling, digestible, carminative, astringent to the bowels; when ripe cures biliousness and "vata" (Ayurveda).

The leaves have a bad taste and smell; diuretic, carminative, laxative, styptic; good in epistaxis and night blindness; improve the eyesight; used in ophthalmia, trichiasis, burns, tuberculous glands, scabies, and old wounds.—The dried flowers are aphrodisiac, diuretic; useful in leucorrhœa, urinary discharges, inflammation of the spleen, scabies, night blindness, anæmia; enrich the blood (Yunani).

The bark of the tree possesses astringent properties, and is used as decoction in darrhœa and dyspepsia as a tonic. In a dilute form, it is used as an astringent lotion for the eyes.

The Hakims apply its powder in ulceration of the cornea, and recommend it internally with black pepper in dysentery (Honigberger).

Arabic: Abnus—; *Baigas:* Tendu—; *Baroda:* Tamrug—; *Bengal:* Kend, Kiu—; *Bombay:* Temru, Timberni, Tumburni, Tumri—; *Burma:* Oukchinya—; *Canarese:* Abanasi, Balai, Bale, Kari, Mallali, Tumari, Tumburasu—; *Central Provinces:* Tendu—; *English:* Coromandel Ebony, Malabar Ebony—; *French:* Bois de Coromandel, Bois d'ébĕne marbré, Ebĕne vrai, Plaqueminier noirâtre—; *Gond:* Tumki, Tummer, Tumri—; *Gujerati:* Tamrug, Tamruj, Timburni, Tumri—; *Hindi:* Abnus, Kendu, Makartendua, Temru, Tendu—; *Italian:* Ebano, Gattolazo—; *Kanara:* Balai—; *Kolaba:* Temburni—; *Kolami:* Goratiril—; Konkan: Abnus—; *Konkani:* Tumri—; *Malaya:* Kend—; *Malayalam:* Kari—; *Marathi:* Kakatembhurni, Temru, Tendu, Timburni, Tumri—; *Panch Mahals:* Timburni—; *Persian:* Abnus—; *Sanskrit:* Dirghapatraka, Jalaja, Kakabijaka, Kakada, Kakapiluka, Kakasphurja, Kakatindu, Kakatinduka, Kakavha, Kakendu, Kakenduka, Kulaka, Kupilu—; *Santal:* Kiril, Terel—; *Tamil:* Karai, Karundumbi, Karupputumbi, Tumbili—; *Telugu:* Manjigata, Nallatumiki, Tumida, Tumiki, Tummika—; *Thana:* Tembhurni—; *Urdu:* Abnus—; *Uriya:* Kendu—.

lanceolate, very acute, glabrous. Female flowers larger and thicker than the male, in short axillary 2-10-flowered cymes. Calyx 1 cm. long, hairy; lobes 6 mm. long, subacute, with reflexed margins. Staminodes 4-5-10, glabrous. Ovary 4-celled; styles 2-5, short. Fruit globose or ellipsoid, pinkish, glabrous; fruiting calyx flat or shallowly cupuliform, the lobes triangular with reflexed margins. Seeds 3-4, usually compressed; testa thin, brown; albumen ruminate.

Distribution: W. Peninsula.

A decoction of the bark is used in rheumatism and swellings.

Canarese: Kari—; *Malayalam:* Kari—; *Saora:* Tadar—; *Tamil:* Karikkattai—; *Uriya:* Koduamoriyo—.

6. **Diospyros ebenum** Koenig in Phys. Sälsk. Hendl. I (1776) 176.—*D. asimilis* Bedd. Madras For. Rep. (1866-67) 20, t.. 1.

A large or moderate sized tree with an erect trunk and leafy head; bark thin, grey; branchlets glabrous. Leaves subcoriaceous, 5-15 by 2-6.3 cm., glabrous, elliptic-oblong or oblong-lanceolate, obtuse or shortly and bluntly acuminate, bright green and shining above, somewhat paler beneath, reticulately veined; petioles 4-8 mm. long. Male flowers 3-12 (very often 3) together, subsessile, in shortly peduncled cymes; peduncles 6 mm. long; buds linear, tapering; bracts small, caducous. Calyx 2.5-4 mm. long, infundibuliform, glabrous or slightly hairy; lobes 4, very short, rounded, ciliate. Corolla pale greenish-yellow, tubular, 1 cm. long before expansion; lobes 4, ovate, equalling or slightly shorter than the tube. Stamens 16 or more, very unequal, often connate in twos, threes, or sometimes fours; filaments more or less pubescent; anthers linear-lanceolate, acuminate. Female flowers solitary, larger than the male; pedicels short, 2-bracteate. Calyx much longer than in the male, deeply divided, with an elevated 4-lobed marginal ring at its mouth; lobes 4, ovate, acute. Staminodes 8, with double anthers. Ovary glabrous, 8-celled; style 1; stigmas 4. Fruit 2 cm. in diam., subglobose; fruiting calyx a hemispheric woody cup which receives the fruit, the 4 ovate acute thickened calyx-lobes spreading outwards. Seeds 3-8, dull black, 1 cm.; albumen not ruminate.

Distribution: W. Peninsula, Assam, Ceylon.—Malaya.

The plant is astringent, attenuant, lithontriptic (Yunani).

Canarese: Bale, Kari, Mallali—; *Central Provinces:* Temru, Tendu—; *Ceylon:* Acha, Chara, Karunkali—; *English:* Ceylon Ebony, Malabar Ebony—; *French:* Bois noir, Ebénier—; *Hindi:* Abnus, Ebans, Tendu—; *Malayalam:* Karu, Mishatumpi, Vayari—; *Manjarabad:* Mallali—; *Marathi:* Abnus, Tai, Tendu—; *Sinhalese:* Kaluwara—; *Tamil:* Kakkayttali, Karai, Karundali, Karungale, Mara, May, Salam, Sulli, Tumbi, Valabattiram—; *Telugu:* Nallavalludu, Nalluti, Tumiki—; *Uriya:* Kendhu, Khenda—.

7. **Diospyros paniculata** Dalz. in Kew Journ. Bot. IV (1852) 109; Bedd. Icon. Pl. Ind. Or. t. 125.

A middle sized tree with cylindric tall stem; bark smooth, dark coloured; branches glabrous, somewhat angular. Leaves alternate 9-23 by 3.5-7.5 cm., subcoriaceous, oblong, obtusely acuminate, glabrous, finely reticulately and conspicuously veined, base rounded or very shortly narrowed; petioles 13 mm. long, wrinkled and usually transversely striate, glabrous. Male flowers 1.3-2 cm. long, numerous, in panicled cymes 2.5-3.8 cm. long in the axils of fallen leaves; panicles, pedicels and buds pubescent with sooty-velvety hairs. Calyx 1 cm. long, divided to the base, shortly nigro-pubescent on both sides; segments foliaceous, reticulately veined, broadly elliptic, obtuse, with a thick hard internal keel and widely reflexed margins. Corolla 1.5 cm. long, clothed outside with sooty-velvety hairs, glabrous inside; tube pentagonal; lobes 1 cm. long, elliptic-oblong, obtuse. Stamens 20, inserted in pairs at the base of the corolla-tube, glabrous; filaments short; anthers linear, acute. Rudimentary ovary 0. Female flowers solitary, axillary; pedicels 13-17 mm. long, bracteate about the middle with large ovate caducous bracts. Calyx glabrescent. Ovary 4-celled; ovule 1 in each cell. Fruit ovoid, 2-3.2 cm. long, rounded at the apex, tipped with the remains of the style, clothed with ferruginous glandular hairs; fruiting calyx 5-lobed, enlarged, more or less plicate; lobes 13-17 mm. long, much widened, auricled and imbricate at the base. Cotyledons foliaceous.

Distribution: W. Peninsula.

The powdered bark is given in rheumatism and ulcers.

The leaves are used as a fish poison.

A decoction of the fruit is given in gonorrhœa, biliousness, and blood poisoning.

French: Bois d'ébĕne ă veines noires, Plaqueminier panaché—; *Malayalam:* Ilakatta, Kari, Karivella—; *Tamil:* Karunduvarai—.

SYMPLOCACEAE.

Trees or shrubs. Leaves alternate, simple; stipules absent. Flowers axillary or terminal, solitary or in spikes, racemes or fascicles, actinomorphic, hermaphrodite, rarely polygamous; sepals 5, connate, valvate; petals 3-11, more or less connate. Stamens inserted on the corolla, 4-numerous, free or variously united, in 1-4 series; anthers subglobose, 2-celled, opening lengthwise. Ovary inferior or semi-inferior, 2-5-celled; ovules 2-4, pendulous; style slender. Fruit baccate, or drupaceous, crowned by the calyx-lobes, 1-5-celled. Seeds solitary in each cell, with copious endosperm; embryo straight or curved; cotyledons very short.—Genera 1. Species 290.—Tropics and subtropics.

Methyl salicylate, an alkaloid—harman—, and a glucoside—jegosaponin—have been isolated.

OFFICIAL:—*Symplocos odoratissima* Choisy (Holland).

SYMPLOCOS Linn.

Trees or shrubs, usually glabrous. Leaves often turning yellow when dry, alternate, coriaceous or membranous, toothed or entire. Flowers usually white, in axillary spikes or racemes, sometimes reduced to few-flowered fascicles or to a single flower; bracts usually solitary at the base of each pedicel, caducous; bracteoles 1-3 beneath the flower. Calyx-tube adnate, short when in flower, often enlarged in fruit; lobes 5, imbricate. Petals 5 in 1 series, or 6-10 in 2 series, free almost or entirely to the base, or obscurely connate (rarely

connate into a tube), imbricate. Stamens usually numerous, many-seriate, adnate to the corolla-tube or to the petals, the outer the longer; filaments filiform or flattened at the base; anthers short dehiscing longitudinally. Ovary inferior (in the Indian species), 3- (rarely 2- or 4-) celled; ovules 2, pendulous from the inner angle of each cell; style usually filiform; stigma capitate or small, scarcely lobed. Drupe ellipsoid or subglobose; stone usually woody, often ribbed, 1-3-seeded. Seeds oblong; embryo terete, straight or curved, in the centre of fleshy albumen; cotyledons much shorter than the radicle. —Species 290.—Tropics and subtropics.

1. Leaves broadly elliptic, closely sharply serrulate towards the acuminate apex .... 1. *S. crataegoides.*
2. Leaves oblong-cuneate at both ends, obscurely crenate; midrib glabrous or pilose beneath .... 2. *S. racemosa.*

The root is aromatic, bitter, and tonic; the bark bitter, astringent, and antiperiodic; the leaves digestive and diaphoretic.

S. alstonia L'Her. is used medicinally in the Andes, *S. platyphylla* Benth. in Brazil, and *S. tinctoria* L'Her. in the Caroline Islands.

Methyl salicylate has been isolated from several species.

The alkaloid 'harman' has been obtained from the bark of *S. racemosa* Roxb.

OFFICIAL:—The leaves of *S. odoratissima* Choisy in Holland.

1. **Symplocos crataegoides** Ham. ex Don. Prodr. 145.—PLATE 587C.

A large shrub or medium sized tree. Young branches more or less pilose. Leaves membranous, 5-10 cm. long, elliptic or ovate-elliptic, acute or acuminate, rounded or cuneate at the base, usually deeply serrate towards the apex, under surface usually pilose especially on the midrib, but sometimes quite glabrous, nerves prominent beneath, petiole 5 mm. long. Flowers pedicelled, white turning to yellow, fragrant, arranged in cymose corymbs on elongate terminal and axillary panicles, those of the lateral branches often few and with longer pedicels; bracts small, linear, caducous. Calyx-tube obconic, glabrous or more or less pilose; lobes rounded or lanceolate

and acute, ciliate. Corolla three times longer than the calyx, 5-part. Stamens 20-60, equalling the corolla in length; filaments connate in 5 bundles. Ovary usually 2-celled, glabrous or hairy. Fruit 3-8 mm., globose or ovoid, crowned with the remains of the calyx-limb, black when ripe.

Distribution: Himalaya up to 9,000 ft. from the Indus to Assam, Khasia Hills, Upper and Lower Burma.

The properties are the same as those of *S. racemosa;* but of the two species this is the better therapeutically (Ayurveda).

The bark is considered tonic. It is also used in ophthalmia.

Basharh: Lojh—; *Burma:* Daukyat—; *Hindi:* Ludh—; *Jaunsar:* Lodh, Lodra—; *Kumaon:* Lodh—; *Punjab:* Laudar, Lodar, Lodh, Loj, Loja, Lu, Pathani—; *Sanskrit:* Akshibheshaja, Bahulatvacha, Brihaddala, Brihadvalka, Brihatpatra, Galava, Jirnabudhna, Jirnapatra, Kramuka, Lakshaprasada, Lakshaprasadana, Lodhra, Patti, Pattikakhya, Pattikalodhra, Shabara, Shirnapatra, Shvetalodhra, Sthulavalkala, Valka, Valkalodhra—; *Sind:* Lodh, Lodur, Pathani—.

2. **Symplocos racemosa** Roxb. Hort. Beng. (1814) 40. —PLATE 587B.

A small evergreen tree with stems up to 6 m. high and 15 cm. diam. Bark dark grey, rough. Blaze 7.5-13 mm., shortly fibrous, pale yellow finely mottled with pale orange brown. Leaves 9-18 by 3.2-5 cm., elliptic-oblong or elliptic-lanceolate, apex acute obtusely-acuminate or obtuse, serrulate obscurely crenate or rarely entire, base acute cuneate, coriaceous, glabrous above, pubescent beneath when young but ultimately glabrous or with scattered spreading hairs mainly on the midrib, glossy on both surfaces, dark green above; lateral nerves indistinct (distinct when dry) 5-9 pairs. Petiole 7.5-18 mm. long. Flowers 1-1.3 cm. diam., white fading yellow, in simple axillary pubescent racemes 1.3-9 cm. long. Bracts ovate, tomentose. Calyx glabrous. Pedicels 1.3-5 mm. long. Drupe 1-1.3 cm. long, oblong, glabrous, purplish black, crowned with the persistent calyx.

Distribution: Throughout N.-E. India, up to 2,500 ft., from the Terai of Kumaon to Assam and Pegu, Chota Nagpur, Burma.

The bark is acrid; cooling, digestible, astringent to the bowels, alexiteric; useful in eye diseases, for spongy gums and bleeding; cures "kapha", biliousness, diseases of the blood, dysentery, inflammations, vaginal discharges, leprosy; useful in abortions and miscarriages; good for ulcers in the vagina.—The flowers are pungent, acrid, sweet, bitter; cooling, astringent to bowels (Ayurveda).

The bark is bitter, acrid; aphrodisiac, emmenagogue tonic for persons of plethoric constitution; cures watery eyes, ophthalmia; good for all diseases of the eye (Yunani).

In Hindoo medicine, the bark is described as cooling, astringent, and useful in bowel complaints, eye diseases, ulcers, etc. A decoction is used as a gargle for giving firmness to bleeding and spongy gums.

It is often used in Bombay in the preparation of plasters (*lep*); it is supposed to promote the maturation or resolution of stagnant tumors.

The bark in 20 grain doses mixed with sugar, is given in menorrhagia due to relaxation of the uterine tissue; it should be given two or three times a day, for three or four days.

"From the above observations, it becomes plain that Lodh should be used in the raw condition, either in powder or in fresh decoction. Alcoholic extracts or watery extracts if kept for sometime deteriorate and become physiologically inert. . . . In all the diseases, in which this drug was tried under the auspices of the Indigenous Drugs Committee—the result was poor or negative, as the drug was administered in Liquid extract form (alcoholic 1 in 1)" (K. C. Bose).

The bark is prescribed in the treatment of snake-bite (Charaka, Sushruta, Vagbhata, Brihannighantaratnakara, Yogaratnakara) and scorpion-sting (Charaka, Sushruta). In snake-bite it is given internally in powder form or in the form of a decoction (Roberts).

The bark is useless in the antidotal treatment of either snake-bite (Mhaskar and Caius) or scorpion-sting (Caius and Mhaskar).

Assam: Bhomroti, Kaviang—; *Bengal:* Lodh—; *Bhutia:* Singyan—; *Bombay:* Hura, Lodh, Lodhra—; *Burma:* Daukyat—; *Central Provinces:* Lod, Tinsah—; *Darjeeling:* Kaidai, Khoidai,

Singen, Sungen—; *English:* Californian Cinchona, China Nora, Lodh Tree—; *Gujerati:* Lodar—; *Hindi:* Lodh—; *Khasia:* Lapongdong—; *Kolami:* Lodh, Ludam—; *Konkani:* Lodh, Lodhra—; *Kumaon:* Lodh—; *Lepcha:* Palyok, Singan—; *Marathi:* Lodh, Lodhra—; *Michi:* Kaiday, Koidoi—; *Mundari:* Ludamdaru—; *Nepal:* Chamlani—; *North-Western Provinces:* Lodh—; *Oudh:* Lodh—; *Sanskrit:* Balabhadra, Balipriya, Bhillataru, Bhilli, Galava, Hastilodhraka, Hemapushpaka, Kandakilaka, Kandanila, Laktakarma, Lodhra, Lodhraka, Lodhravriksha, Mahalodhra, Marjana, Rodhra, Shahara, Shaharalodhra, Shambara, Shavaraka, Shukla, Tilaka, Tirita, Tiritaka, Vanarajhata—; *Santal:* Lodam—; *Telugu:* Lodduga, Sabaramu, Sapara—; *Urdu:* Lodapathani—; *Uriya:* Lodho—.

OLEACEAE.

Trees or shrubs, the latter often scandent. Leaves opposite (rarely alternate or verticillate), simple or 3-few-foliolate, entire or toothed; stipules 0. Flowers hermaphrodite, often dimorphous (rarely dioecious or polygamous), regular in terminal or axillary cymes or panicles (rarely fascicled or racemose). Calyx free (rarely 0), usually small, campanulate, truncate or 4- (sometimes 5-9-) lobed. Corolla usually gamopetalous (rarely 4-9-petalled or 0); tube long or short; lobes or petals 4-12, imbricate or induplicate-valvate in bud. Stamens usually 2 (in Indian species), inserted on the corolla or (in the polypetalous or apetalous genera) hypogynous; filaments usually short; anthers rather large, ovate-oblong (rarely linear), dehiscing on the margin or subextrorsely. Ovary free, 2-celled; ovules 1-2 (rarely 3-4) in each cell, attached to the inner angle near the apex or base; style usually short; stigma simple or 2-lobed. Fruit capsular, loculicidally 2-valved or indehiscent, or a berry or a drupe. Seeds solitary or 2 in each cell, erect or pendulous; testa usually thin; albumen fleshy or horny, often oily

or 0; embryo straight; radicle inferior or superior.—Genera 21. Species 400.—Tropical and warm temperate, especially E. India.

A. Corolla-lobes much imbricate. Seeds erect
   1. Scandent shrubs, fruit baccate .... JASMINUM.
   2. Erect small tree. Capsule bipartite .... NYCTANTHES.
B. Fruit dry, loculicidal. Seeds pendulous, winged
   Corolla-lobes imbricate. Fruit woody, pyriform .... SCHREBERA.
C. Fruit samaroid. Petals valvate or absent
   Trees, leaves pinnate .... FRAXINUS.
D. Fruit a drupe or berry. Corolla small
   Corolla tubular or absent. Inflorescence axillary except in
   O. *glandulifera* .... OLEA.

Bark and leaves bitter, astringent, tonic, and febrifuge. Flowers sedative, antispasmodic, and aperient.

Glucosides—fraxin, phytosterolin, quercitrin, syringin—have been obtained from various members.

OFFICIAL:—*Fraxinus excelsior* Linn. (Belgium); *F. Ornus* Linn. (Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States)=*Ornus europaea* Pers. (Portugal); *F. rotundifolia* Miller (Italy, Spain)=*Ornus rotundifolia* Pers. (Portugal).

Olea europaea Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States),—var. *β. sativa* De Cand.=*O. sativa* Hoffmseg. and Link. (Portugal).

JASMINUM (Tourn.) Linn.

Branched shrubs, erect or scandent. Leaves opposite (rarely alternate), simple, 3-foliolate or imparipinnate. Flowers often handsome, in cymes at the ends of the branches (rarely solitary). Calyx 4-9- toothed or -lobed or almost -partite. Corolla hypocrateriform, white, pink or yellow; tube narrow; lobes 4-12, spreading, imbricate in bud. Stamens 2, included in the corolla-tube; filaments very short; anthers attached at the back near the base, the connective usually mucronate. Ovary 2-celled; ovules usually 2 in each cell, attached near the base; style cylindric; stigma at length usually 2-fid. Berry didymous or often by suppression simple, carpels globose, ellipsoid

or elongate. Seed usually solitary in each carpel, erect; albumen 0; cotyledons plano-convex; radicle inferior.—Species 170.—Tropics and subtropics.

A. Leaves all simple
1. Leaves short-petioled, ovate, nearly glabrous .... 1. *J. sambac.*
2. Leaves ovate-acute, hairy .... 2. *J. pubescens.*
3. Leaves elliptic-acute, softly hairy on both surfaces or glabrous .... 11. *J. rottlerianum.*
4. Leaves obcordate or ovate-acute, finally glabrous .... 3. *J. arborescens.*
5. Leaves ovate-lanceolate, glabrous or nearly so .... 8. *J. scandens.*
6. Leaves small, ovate, those of the lateral branchlets half as large, acute, base obtuse or almost rounded, glabrous .. 4. *J. angustifolium.*
7. Leaves ovate or elliptic, shortly acuminate, base broadly cuneate .... 10. *J. ritchiei.*

B. Leaves (some of them) compound
1. Leaves mostly simple, ovate, some 3-foliate .... 9. *J. auriculatum.*
2. Glabrous, puberulous. Leaves alternate, 3-foliolate or pinnate .... 5. *J. bignoniaceum.*
3. Glabrous or nearly so. Leaves opposite, pinnate. Leaflets rhomboid, oblong-acute .... 6. *J. officinale.*
4. Glabrous or nearly so. Leaves opposite, pinnate. Leaflets rhomboid-oblong .... 7. *J. grandiflorum.*

Flowers sedative and antispasmodic; used as tonic aperient, and emollient.

The following species are used medicinally in Europe—*J. bignoniaceum* Wall., *J. fruticans* Linn., *J. grandiflorum* Linn., *J. odoratissimum* Linn., *J. officinale* Linn.—; in Egypt—*J. sambac* Ait.—; in Abyssinia—*J. floribundum* R. Br.—; in China—*J. nudiflorum* Lindl., *J. sambac* Ait.—; in the Philippine Islands—*J. sambac* Ait.—; in the Dutch Indies—*J. glabriusculum* Bl., *J. scandens* Vahl.—; in Guiana—*J. grandiflorum* Linn.—.

1. **Jasminum sambac** Ait. Hort. Kew. I (1789) 8; Wight Ic. t. 704.—PLATE 588B.

A suberect shrub, scarcely climbing; young branches pubescent. Leaves opposite, membranous, 3.8-11.5 by 2.2-6.3 cm., variable in shape, usually broadly ovate or elliptic, acute, obtuse or acuminate, entire, glabrous or nearly so, base rounded or subcordate, rarely acute; main nerves 4-6 pairs; petioles 3-6 mm. long, hairy. Flowers

white, very fragrant, solitary or usually in 3-flowered (many-flowered in cultivation) terminal cymes; bracts linear-subulate; pedicels 6 mm. long, hairy. Calyx 1-1.3 cm. long, hairy; teeth 5-9, linear-subulate, 6-10 mm. long. Corolla-tube 1.3 cm. long; lobes as long as the tube, narrowly oblong, acute or obtuse in cultivation orbicular. Ripe carpels 1-2, subglobose, 6 mm. diam., black, surrounded by the sub-erect calyx-teeth.

Distribution: Cultivated throughout India and the tropics of both hemispheres.

The flower is bitter, pungent; cooling; alexiteric; cures "tridosha", biliousness, itching sensation; useful in diseases of the eye, the ear, and the mouth; good for skin diseases, leprosy, ulcers (Ayurveda).

The flower has a bitter bad taste; tonic to the brain, purgative; allays fever; stops vomiting and hiccough (Yunani).

The medicinal properties are the same as those of *J. grandiflorum* (Ayurveda).

The plant is considered cool and sweet; it is used as a remedy in cases of insanity, in weakness of sight, and affections of the mouth.

In Goa, the root of the wild variety is used as an emmenagogue.

The dried leaves, soaked in water and made into a poultice are used in indolent ulcers.

The flowers act as a lactifuge, and are said to arrest the secretion of milk in the puerperal state in cases of threatened abscess. For this purpose about two or three handfuls of the flowers are bruised and applied unmoistened to each breast, and renewed once or twice a day. The secretion is sometimes arrested in twenty-four hours, though this generally requires two or even three days.

Arabic: Saman, Sosan, Suman, Vardeabyaz, Yasaman—; *Balabac:* Hubar—; *Bengal:* Banmallika, Bel, Mallik, Mogra, Nabamallika—; *Bombay:* Mogri—; *Burma:* Mali, Sabay, Thaembaumali—; *Canarese:* Chandumallige, Dundumallige, Elusuttinamallige, Gundumallige, Iravantige, Kadurumallige, Kolumallige, Malli, Mallige, Sanjimallige—; *Chinese:* Mo Li—; *Cuba:* Jazmin de Francia—; *English:* Arabian Jasmine, Lily Jasmine, Sambac Jasmine, Tuscan Jasmine—; *French:* Jasmin d'Arabie—; *Gujerati:* Mogro—;

Hindi: Banmallika, Bel, Chamba, Mogra, Motia, Mugra—; *Java:* Melati—; *Kathiawar:* Dolara—; *Konkani:* Mogorim—; *Koya:* Navamallika—; *Malayalam:* Cherupichakam, Chirakamulla, Kutamulla, Mallika, Mulla, Nallamulla, Pichakam, Pichakamulla—; *Marathi:* Mogara, Mogra—; *Mundari:* Atalba, Huringhundiba, Nariatalba—; *Nasirabad:* Raibel—; *Pampangan:* Campopot, Culatai, Pougso, Sampagang—; *Persian:* Gulesuped, Zambak—; *Philippines:* Sampaguitas—; *Punjab:* Chamba, Chambeli, Mugra—; *Sanskrit:* Ananga, Ashtapadi, Asphota, Atigandha, Bhadravalli, Bhupadi, Dalakoshaka, Dantapatra, Devalata, Gandharaja, Gandhasara, Gauri, Gavakshi, Gigija, Janeshta, Kamabana, Kausika, Madayanti, Malli, Mallika, Mrigeshta, Muktabandhana, Mudgara, Mudgaraka, Narishta, Navamallika, Pramodini, Priya, Rajaputri, Saptala, Saptapatra, Saumya, Shatapada, Shatpadananda, Shitabhiru, Shripadi, Sita, Sitabiru, Trinasakhya, Trinashunya, Vanachandrika, Varshiki, Vartula, Vitapriya—; *Saora:* Myaliyavodima, Satratar—; *Sinhalese:* Pichchimal—; *Spanish:* Chamela, Gamela, Jazmin de Arabia, Sambac—; *Tagalog:* Sampaga—; *Tamil:* Anangam, Iruvachi, Iruvadi, Karumugai, Koguttam, Kudamalligai, Maladi, Malli, Malligai, Malligam, Mayilam, Mullaikkodi, Peramalli, Perumalligai, Pittigai, Sadaviru, Selugam, Sindu, Talavam, Talavu—; *Telugu:* Boddumalle, Bondumalle, Gundemalle, Malle, Manmathabanamu, Virajadi, Virajaji—; *Tulu:* Malligedai—; *Urdu:* Azad, Raibel, Sosan—; *Uriya:* Belophulo, Bondumalle, Moli, Molli, Mollika—; *Visayan:* Capopat, Manul—.

2. **Jasminum pubescens** Willd. Sp. Pl. I (1797) 37.—*J. hirsutum* Willd. l. c. 36; Wight Ic. t. 702.—PLATE 589.

A scandent shrub; young branches clothed with velvety pubescence or tomentum. Leaves opposite, 3.8-7 by 1.6-3.8 cm., ovate, acute, often mucronate, softly pubescent or tomentose on both surfaces, often at length glabrate above, base rounded or often cordate; main nerves 4-6 pairs; petioles 6-10 mm. long, densely villous. Flowers white, sessile, in dense terminal capitate cymes often at the extremities of short axillary branches; bracts large, ovate, acute foliaceous, green. Calyx 1.3-1.6 cm. long, densely fulvous-villous; teeth 8-13 mm. long,

subulate, fulvous-hairy. Corolla glabrous; tube 2-2.2 cm. long; lobes 6-9, elliptic-oblong, acute, often mucronate, 13 mm. long. Carpels 1-2, globose, 6 mm. diam., black, surrounded by the suberect calyx-teeth.

Distribution: Throughout India, Burma.—China.

The flowers are acrid and bitter; cooling, laxative, digestible, cardiotonic, alexiteric; cure "vata"; useful in biliousness, inflammation, blood complaints (Ayurveda).

The dried leaves soaked in water and made into a poultice are used in indolent ulcers to generate a healthy action.

The root is said to be an efficient cure for snake-bite. Bapat prescribes the juice of the leaves. Neither the root nor the leaves are an antidote to snake-venom (Mhaskar and Caius).

Bengal: Kunda, Kundphul—; *Burma:* Sabe—; *Canarese:* Bastimallige, Kasturimallige, Kunda, Molle—; *English:* Common Jasmine, Downy Jasmine, Musk Jasmine—; *Hindi:* Chameli, Kunda, Kundo, Kundphul—; *Kumaon:* Chameli—; *Malayalam:* Gujari, Kattuchirakamulla, Kundam, Kurukuttimulla, Kuruna—; *Marathi:* Mogra—; *Sanskrit:* Atimukta, Attahasa, Attapushpaka, Bhringasuhrita, Bhringbandhu, Dalakosha, Damana, Kunda, Madhya, Mahamoda, Makaranda, Manodna, Manohara, Manorama, Mughya, Muktapushpa, Sadapushpa, Shuklapushpa, Tarapushpa, Vanahasa, Varata, Vasanta—; *Saora:* Puttaditige—; *Tamil:* Magarandam, Malligai—; *Telugu:* Adavimalle, Gujari, Kundamu, Molla—; *Tulu:* Boldumallige—; *Uriya:* Kontabelo—.

3. **Jasminum arborescens** Roxb. Hort. Beng. (1814) 3; Wight Ic. t. 699.—*J. latifolium* Roxb.; Wight Ic. t. 703.—PLATE 590.

A large suberect shrub with straggling branches. Leaves opposite, simple, 5-7.5 cm. long, ovate or ovate-oblong, acuminate, glabrescent when mature; petiole 1-2 cm. long, rather slender. Flowers 2.5-3.3 cm. across, white, fragrant, in lax trichotomous pubescent panicles. Calyx 5-7.5 mm. long, hairy; teeth linear-subulate, as long as or rather longer than the tube. Corolla-tube

1-1.3 cm. long; lobes 9-12, linear-lanceolate, acute. Ripe carpel usually 1, oblong or ellipsoid, often curved, nearly 1.3 cm. long, black.

Distribution: Upper Gangetic Plain, ascending to 3,000 ft. on the Himalaya, Bengal, Central and S. India, hills of Ganjam and Vizagapatam.

The juice of the leaves is used, with pepper, garlic and other stimulants as an emetic, in obstruction of the bronchial tubes by viscid phlegm. Seven leaves will furnish sufficient juice for a dose. For young children, the juice of half-a-leaf and of four leaves of *Sesbania grandiflora* may be mixed with two grains of black pepper and 2 grains of dried borax and given in honey.

The leaves are slightly bitter and astringent, and might be used as a tonic and stomachic.

The Santals give a preparation of the plant in certain menstrual complaints.

Bengal: Burakunda, Nuvamullika—; *Bombay:* Kusar—; *Canarese:* Doddakadumallige, Navamalike—; *English:* Tree Jasmine—; *Haldwani:* Kutmanibel—; *Hindi:* Bela, Chameli, Mutabela, Navamallika, Saptala—; *Marathi:* Kusar, Kusara—; *Mundari:* Cauliba, Hundiba—; *Nasirabad:* Guldangar—; *Sanskrit:* Navamallika, Saptala, Varakunda—; *Santal:* Gadahundbaha—; *Tamil:* Nagamalli—; *Telugu:* Adavimalle, Nagamalle—; *Uriya:* Bonomolli, Niyali—.

4. **Jasminum angustifolium** Vahl Enum. Pl. I (1805) 29; Wight Ic. 698.—PLATE 591.

Stems glabrous, twigs pubescent. Leaves simple, numerous, very variable even on the same plant, small, usually 1.3-5 cm. but sometimes attaining 9 cm., ovate-oval or oval-lanceolate, rounded at base, sometimes attenuate, obtuse or acute at apex, glabrous. Flowers on long slender pedicels, solitary or more usually in threes at ends of short lateral divaricate twigs. Calyx glabrous, segments distant, short, 3-4 mm., filiform, acute; corolla-tube about 1.6 cm., lobes 7 or 8, equalling the tube, linear-oblong, very acute, ripe carpels about 8 mm., broadly ovoid both usually developed.

Distribution: Circars, Deccan, Carnatic, on eastern side, down to Travancore, low country of Ceylon.

The bitter root, ground small and mixed with the powdered root of *Acorus Calamus* and lime-juice, is considered a valuable external application in cases of ringworm.

Canarese: Kadumallige, Vanamallige—; *English:* Wild Jasmine—; *Hindi:* Banmallika, Mwari—; *Malayalam:* Kattumallika, Kattumulla, Kattupichakam, Kattupichakamulla, Vanamallika, *Sanskrit:* Asphota, Kanamallika, Priya, Supuja, Vanamalli—; *Sinhalese:* Valsamanpichha, Walpichcha—; *Tamil:* Adachalam, Adigal, Kanmelaval, Kattumalligai, Kava, Kecham, Maladi, Marugu, Manval, Mullai, Sirumalligai, Vanamalligai—; *Telugu:* Adavimalle, Chirumalle, Garudamalle, Lingamalle—; *Tulu:* Edroli—.

5. **Jasminum bignoniaceum** Wall. Cat. 2888.—*J. humile* Linn. Sp. Pl. (1753) 7; Clarke in Hook. f. Fl. Brit. Ind. III, 602 (partim).—*J. revolutum* Sims, var. *peninsulare* A. DC.; Wight Ic. t. 1258.—PLATE 592 (under *J. humile* Linn.).

An erect shrub with numerous green, very angular branches; bud-scales persistent as a cup at the base of the year's shoot; youngest parts pubescent. Leaves alternate, 2.5-7.5 cm., pinnate with about 7 leaflets; main stalk grooved above, green; leaflets 13 by 6 mm., elliptic-acute at both ends, or diamond-shaped, dull green on both sides. Flowers solitary or in dense cymes at the ends of the twigs, full yellow; pedicel 8 mm., pubescent, expanded below the calyx. Calyx 2 mm.; teeth 5, triangular, very small. Corolla-tube 1.3-1.6 cm., 1.5 mm. wide at the base and 4 mm. just below the spreading 6 mm. limb of 5 triangular lobes. Anthers 3 mm., sessile near the top of the tube, opening inwards. Style bent, appressed to one side of the corolla-tube at the base; stigma large, exserted above the corolla. Fruit of 2 globose berries, 6-8 mm. each.

Distribution: Madras Presidency: W. Ghats, Nilgiris, Pulneys, hills of Malabar and Travancore, above 5,000 ft., Ceylon.

The therapeutic properties are the same as those of *J. officinale* (Ayurveda).

The flower is a tonic to the heart and the bowels; cooling to the brain; astringent to the bowels (Yunani).

The root is useful in ringworm (Honigberger). The milky juice, which exudes on an incision in the bark of this plant, is alleged to have the power of destroying the unhealthy lining walls of chronic sinuses and fistulas.

Bengal: Svarnajui—; *Bombay:* Hemapushpika—; *Canarese:* Hasarumallige—; *English:* Golden Jasmine, Italian Jasmine, Nepal Jasmine, Yellow Jasmine—; *Hazara:* Chamba—; *Hindi:* Malto, Pitmalti—; *Jaunsar:* Shanjoi, Shunjai—; *Kumaon:* Kurang, Sonajahi—; *Malayalam:* Pita, Ponmallika—; *Pangi:* Suni—; *Punjab:* Chamba, Jai, Juari, Kuja, Marti, Naugei, Puring, Ri, Shing, Sim, Summun, Tsonu—; *Sanskrit:* Gandadhya, Haima, Hemapushpi, Hemapushpika, Kanakaprabha, Manohara, Nagapushpika, Pitayuthi, Pitika, Raktagandha, Shikhandi, Sugandha, Suvarnavha, Suvarnayuthika, Svarnayuthi, Vyaktagandha, Yuvatishtha—; *Tamil:* Pidayudi, Pidigai, Semmalligai, Seppumalligai, Suvannayudi—; *Telugu:* Hemapushpika, Pachayadavimolla—; *Urdu:* Kuja—.

6. **Jasminum officinale** Linn. Sp. Pl. (1753) 7.—Plate 588A.

A twining shrub puberulous when young, branches striate. Leaves opposite, imparipinnate, 5-10 cm. long, petiole and rhachis narrowly margined. Leaflets 3-7, the terminal 2.5-7.5 by 1-2.5 cm., usually distinctly larger than the rest, ovate or lanceolate, acuminate; the lateral shorter and relatively broader, acute, sessile or shortly petiolulate, the distal pair sometimes with broad connate bases. Flowers 1.7-2.5 cm. across, in terminal few-flowered corymbs or cymes and axillary pedunculate few-flowered cymes shorter than the leaves or the cymes often reduced to a single flower; pedicels of the cyme-flowers 7.5-18 mm. long, those of the solitary and corymb-flowers often much longer; bracts up to 1.3 cm. long, linear-subulate or narrow-linear. Calyx 7.5-18 mm. long, puberulous, tube 2.5-3.8 mm. long; lobes 5, subulate, 2-4-times as long as the tube. Corolla-tube 1.3-1.8 cm. long; lobes 5, ovate or elliptic. Carpels 2, 7.5-10 mm. long, ellipsoid or subglobose, colourless, translucent.

Distribution: Himalaya, 3,000—9,000 ft. from the Indus eastwards, extending into the inner valleys, Trans-Indus.—Afghanistan, Persia. Often cultivated in India, China, Europe, etc.

The flower is bitter, acrid, sweetish, with a flavour; cooling; alexipharmic; useful in diseases of the heart, diabetes, biliousness, burning sensation, thirst, diseases of the blood and of the skin, troubles in the mouth, the teeth, or the eye; causes "kapha" and "vata" (Ayurveda).

The root has been found useful in ringworm (Honigberger).

Canarese: Sannajajimallige—; *Catalan:* Gessami, Llassami—; *Chenab:* Bansu, Dumni, Kwer—; *Dutch:* Jasmijn—; *English:* Common White Garden Jasmine, White Jasmine—; *French:* Jasmin blanc, Jasmin commun, Jasmin officinal—; *German:* Jasmin—; *Hindi:* Chamba—; *Jaunsar:* Holbali—; *Kashmir:* Chamba, Chirichog, Kiri—; *Kumaon:* Chambeli, Jai—; *Muttiana:* Suni—; *Portuguese:* Jasmim—; *Punjab:* Bansu, Dassi, Dumni, Jai, Kwer, Marti, Naugri, Puring, Ri, Samsem, Shing, Sim, Somun, Suni—; *Ravi:* Dassi, Samsem—; *Roumanian:* Iasomie—; *Russian:* Jasmin—; *Sanskrit:* Ambashtha, Bahugandha, Balapushpi, Balapushpika, Bhringananda, Charumoda, Gajavhaya, Ganika, Gunajvala, Harini, Magadhi, Modani, Prahasanti, Punyagandha, Shankhayuthika, Shikhandi, Shikhandini, Sugandhika, Vasanti, Yuthika, Yuthitaruni—; *Spanish:* Jazmin comun, Jazmin morisco, Jazmin oficinal—.

7. **Jasminum grandiflorum** Linn. Sp. Pl. ed. 2 (1762) 9; Wight Ic. t. 1257.— PLATE 593.

A large twining nearly glabrous shrub, often seen suberect, branches striate. Leaves opposite, imparipinnate, 5-12.5 cm. long, petiole and rhachis margined. Leaflets 7-11, the terminal 2.5-3.8 by 1.3-1.8 cm., larger than the rest but not very markedly so, rhomboid-ovate or -lanceolate, acute or acuminate; the lateral ovate, usually obtuse, mucronate, the distal pair with broad connate bases often confluent with the terminal, the proximal pair shortly petiolulate, the intermediate sessile. Flowers 3-3.8 cm. across, white, often tinged with pink outside, in lax axillary and terminal cymes longer than the leaves; pedicels 1.3-2.5 cm. long; bracts, the lower often large, ovate to spathulate-oblong, foliaceous, the upper small, linear. Calyx 5-10 mm. long, glabrous, tube 2.5 mm. long or less; lobes 5,

subulate, 2-3 times as long as the tube. Corolla-tube 1.8-2.5 cm. long; lobes 5, elliptic or obovate. Carpels 2 (not seen ripe).

Distribution: Subtropical N.-W. Himalaya, 2,000—5,000 ft., Salt Range, Trans-Indus, eastwards to Kumaon, hills of Rajputana and Central India. Often cultivated in Indian gardens.

The flower is acrid, bitter, with a sharp taste; heating, emetic, alexiteric, vulnerary; useful in stomatitis and diseases of the mouth, the head, the teeth and the eyes; very good in toothache, suppurations, and earache; given in diseases of the blood, leprosy, ulcers, biliousness (Ayurveda).

The plant is deobstruent, anthelmintic, diuretic, emmenagogue. —The root is purgative, expectorant, anthelmintic, soporific, intoxicating; cures headache, biliousness, paralysis, rheumatism.—The flower has a bitter, bad taste; tonic; purgative, alexiteric, aphrodisiac; good in headache, asthma, caries of the teeth, stomatitis.—The oil is bitter; good for old people; lessens inflammation, softens the skin; tonic to the brain, aphrodisiac, anthelmintic; good for pains in the joints and the ear, for scabies (Yunani).

The scented oil is considered cooling.

The fresh juice of the leaves is applied to soft corns between the toes. In ulcerations or eruptions, in the mucous membrane of the mouth, the leaves are recommended to be chewed. An oil prepared with the juice of the leaves is poured into the ear in otorrhœa.

In the United Provinces, the flowers and their essence are used as an application in skin diseases, headache, and weak eyes; the leaves are used in toothache.

In French Guiana, the flowers are considered bechic.

Charaka and Sushruta recommend the flower for use in the treatment of snake-bite and scorpion-sting; but it is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Benzyl acetate is the chief constituent of the oil from the flowers which also contains methyl anthranilate and 1-linalool.

Arabic: Pasmain—; *Bengal:* Jati—; *Bombay:* Chambeli—; *Burma:* Myatle, Myatloe—; *Canarese:* Ajjige, Ajjuge, Anejajimallige, Anemallige, Jaji, Jajihuvvu, Jajimallige, Jati—; *Catalan:*

Gessami real, Llassami real—; *English:* Catalonian Jasmine, Spanish Jasmine—; *French:* Jasmin de Catalogne, Jasmin d'Espagne, Jasmin royal—; *Garhwal:* Joi—; *Gujerati:* Ghambeli—; *Hindi:* Chambeli, Chameli, Jati—; *Jaunsar:* Chambeli—; *Kotra:* Chambeli—; *Malayalam:* Malati, Pichakam, Pichakamulla—; *North-Western Provinces:* Jahi—; *Persian:* Hashim—; *Punjab:* Chamba, Chambeli, Jati—; *Sanskrit:* Balihrasa, Chambeli, Chetaki, Hridyagandha, Janeshta, Jati, Malati, Malini, Manodna, Manohara, Nripatmaja, Prahasanti, Priyanvada, Rajaputri, Rajaputrika, Sandhyapushpi, Shrimati, Sukumari, Sumana, Surabhigandha, Surapriya, Surupa, Suvarsha, Suvasanta, Svarnajatika, Tailamalini, Upajati, Varshabhava, Varshapushpa, Veshika—; *Spanish:* Jazmin de Espana, Jazmin oloroso, Jazmin real—; *Tamil:* Kodimalligai, Manmadabanam, Padarmalligai, Pichi, Sadimalligai—; *Telugu:* Jaji, Malati—; *Tulu:* Jajipu—; *Urdu:* Chambeli—; *Uriya:* Chompeli, Jaiphulo, Jati, Kundi, Maloto—.

8. **Jasminum scandens** Vahl Symb. III, 2.

Scandent; branchlets pubescent. Leaves 9 by 3.8 cm., ovate-lanceolate, acuminate, base rounded, pubescent on the nerves beneath or glabrous, coriaceous; nerves few, remote; petiole 6 mm. Cymes subcapitate pubescent, dense, often on short axillary branches; bracts 4 mm. linear, but the cymes frequently subsessile between the 2 uppermost leaves; pedicels 0-2.5 mm. Flowers white, often tinged pink, very fragrant. Calyx-teeth 1.5-3 mm. short linear pubescent divaricate or recurved in flower. Corolla-tube scarcely 1.3 cm.; teeth 6-8 mm., oblong, acute. Carpels 8 by 6 mm., ellipsoid.

Distribution: Lower hills of Sikkim, Assam, Khasia, Cachar, Bengal, Burma.

The root is useful in the treatment of ringworm.

Burma: Tawsabe, Thingwe—; *Nepal:* Harelachara—.

9. **Jasminum auriculatum** Vahl Symb. Bot. III (1794) 1; Wight Ic. t. 700.

A scandent shrub more or less pubescent or velvety, sometimes nearly glabrous. Leaves 3-foliolate, the 2 lateral leaflets very small,

often wanting, the central leaflet 2-3.2 by 1-1.5 cm., broadly ovate or sometimes nearly orbicular, acute, acuminate, or rounded, often apiculate at the apex, velvety-pubescent or glabrous, base usually rounded; main nerves few, inconspicuous; petioles very short. Flowers white, in compound, many-flowered, pubescent, lax, corymbose cymes; bracts 3-4 mm. long, linear-lanceolate, acute; pedicels 3-6 mm. long, Calyx 4 mm. long, pubescent; teeth minute (about 0.5-0.6 mm. long), oblong, obtuse. Corolla glabrous; tube 13 mm. long; lobes 5-7, elliptic-oblong, acute, 6 mm. long. Carpel solitary, 5 mm. diam., globose, black.

Distribution: Deccan-Carnatic, W. Peninsula, Ceylon.

The flower is given in consumption.

Canarese: Hurinaballi, Madhyanamallige, Magadhi, Sannamallige, Sevantige, Sujimallige—; *La Reunion:* Jasmin du pays—; *Malayalam:* Bolidda—; *Sanskrit:* Ambashtha, Ganika, Jai, Magadhi, Suchimallika, Yuthika—; *Tamil:* Mullaikkodi, Udigai, Usimalligai, Vanamalligai—; *Telugu:* Adavimolla, Ettadavimolla, Magadhi, Maghyamu, Malletige, Molla, Sannajaji, Sudimalle, Telladavimolla, Vasanti—; *Uriya:* Bonomollika, Jui, Jutdhika—.

10. **Jasminum ritchiei** C. B. Clarke in Hook. f. Fl. Brit. Ind. III (1882) 598.

A climbing branched shrub, glabrous or nearly so. Leaves opposite, 3.8-11.5 by 2-4.5 cm., elliptic, acuminate, glabrous above, glabrous or hairy on the nerves beneath, base cuneate; main nerves 4-5 pairs, often tufted in the axils; petioles 3-6 mm. long. Flowers white, in few (3-9-) flowered, very lax, often subpaniculate cymes; bracts linear-subulate, 6 mm. long; pedicels 1.3-2.5 cm. long. Calyx 5 mm. long; tube campanulate, more or less ribbed, glabrous; teeth 2-3 mm. long, linear or sometimes subtriangular, often ciliate. Corolla glabrous; tube 1.5-2 cm. long; lobes 10-13 mm. long, linear, acute. Carpels solitary, 8 mm. diam., almost accurately spherical.

Distribution: W. Peninsula.

The leaves are used in toothache, and the flowers in piles.

Saora: Tigemalle—; *Tamil:* Karumullai—; *Telugu:* Adivimalle—.

11. **Jasminum rottlerianum** Wall. Cat. 2865; Wight Ic. t. 1249.

A scandent fulvous-hairy shrub; branches terete, velvety. Leaves opposite, 4.5-10 by 2.5-4.5 cm., elliptic, acute or acuminate, softly hairy on both surfaces or glabrate above, base usually rounded; main nerves about 6 pairs; petioles 3-6 mm. long, jointed in the middle, densely villous. Flowers white, in terminal cymes; peduncles hairy, usually 3, each bearing a small fascicle of flowers at the apex; pedicels 1-2 mm. long, stout, hairy; bracts white, 1-1.5 cm. long, lanceolate, acuminate, more or less pubescent, ciliate. Calyx 8 mm. long, hairy; teeth 6 mm. long, subulate, hairy. Corolla glabrous; tube 2-2.5 cm. long; lobes 5-7, oblong, obtuse, apiculate, 13 mm. long. Fruit ellipsoid, 13 by 8 mm., smooth, black.

Distribution: W. Peninsula.

The leaves are used in eczema.

Canarese: Varamallige—; *Tamil:* Erumaimullai, Uyyakondan—.

Nyctanthes Linn.

Shrubs or small trees. Leaves opposite, entire or toothed. Flowers sessile, in pedunculate heads involucrate with ovate bracts; peduncles axillary and terminal. Calyx narrowly campanulate or subcylindric, truncate or indistinctly toothed, finally splitting or deciduous. Corolla hypocrateriform; tube cylindric, orange; lobes 4-8, contorted in bud, spreading. Anthers 2, subsessile near the top of the corolla-tube. Capsule chartaceous, much-compressed, parallel to the partition, separating when ripe into two 1-seeded cells. Seed erect, flattened; testa thin; albumen 0; cotyledons flat; radicle inferior.—Species 2.—Indo-Malayan.

N. arbor-tristis Linn. is used medicinally wherever it is found growing.

1. **Nyctanthes arbor-tristis** Linn. Sp. Pl. (1753) 6.—Plate 594.

A large shrub or small tree rough all over with stiff whitish hairs; young branches sharply quadrangular, hairy. Leaves opposite,

5-10 by 2.5-6.3 cm., ovate, acute or acuminate, rough and scabrous above with short bulbous hairs, densely pubescent beneath with appressed hairs, entire or with a few large distant teeth, base rounded or slightly cuneate; main nerves few, conspicuous beneath; petioles 6 mm. long, hairy. Flowers delightfully fragrant, sessile in pedunculate bracteate fascicles of 3-5; peduncles 4-angled, slender, hairy, axillary and solitary and in terminal short trichotomous cymes; bracts broadly ovate or suborbicular, 6-10 mm. long, apiculate, hairy on both sides. Calyx 6-8 mm. long, narrowly campanulate, hairy outside, glabrous inside, truncate or obscurely toothed or lobed, ciliate. Corolla glabrous, rather more than 13 mm. long; tube 6-8 mm. long, orange-coloured, about equalling the limb; lobes white, unequally obcordate, cuneate. Capsule 2 cm. long and broad, obcordate or nearly orbicular, compressed, 2-celled, separating into 2 flat 1-seeded carpels, reticulately veined, glabrous.

Distribution: Outer Himalayan ranges from the Chenab to Nepal, Assam, Burma, Bengal, Central India, southwards to the Godavari. Cultivated in many parts of India.

The juice of the leaves is bitter and acrid; cures fevers.—The bark cures bronchitis.—A decoction of the bark, leaves, roots, and flowers is given in excessive diuresis and in enlargement of the spleen. —The oil from the bark is used for pain in the eye (Ayurveda).

The flowers have a bitter bad taste; stomachic, carminative, astringent to the bowels; lessen inflammation; a tonic to the hair; the buds are tonic.—The leaves are useful in obstinate fevers.—The seeds are useful in piles and skin diseases (Yunani).

The leaves are useful in fever and rheumatism. The fresh juice of the leaves is given with honey in chronic fever. A decoction of the leaves, prepared over a gentle fire, is recommended as a specific for obstinate sciatica.

Six or seven of the young leaves are rubbed up with water and a little fresh ginger, and administered in obstinate fevers of the intermittent type, at the same time a purely vegetable diet is enforced. The powdered seeds are used to cure scurfy affections of the scalp.

In the Konkan, about 5 grains of the bark are eaten with betelnut and leaf, to promote the expectoration of thick phlegm.

It is antibilious and expectorant, and useful in bilious fevers.

The expressed juice of the leaves acts as a cholagogue, laxative and mild bitter tonic. It is given with a little sugar to children as a remedy for intestinal (thread and round) worms. In several cases, it has been found to act efficaciously.

Of the 34 malarial cases we have treated with the leaves 29 had no fever at the time of their discharge from the hospital (Caius and Mhaskar).

The bark, though prescribed for snake-bite (Bapat), is not an antidote to snake-venom (Mhaskar and Caius).

Baigas: Kirsahar—; *Bengal:* Harsinghar, Sephalika, Singhar—; *Bhil:* Karassi—; *Bombay:* Har, Harasingara, Parijataka, Shiuli, Singahar—; *Burma:* Hseikbalu, Seikpalu, Tsaybeeloo—; *Canarese:* Goli, Harisringi, Hursing, Parijata, Parijataka—; *Central Provinces:* Shiralli, Siralu—; *Dehra Dun:* Hurri—; *English:* Coral Jasmine, Indian Mourner, Night-flowering Jasmine, Sorrowful Tree—; *French:* Arbre triste—; *Garhwal:* Kuri—; *Gond:* Khersari—; *Gujerati:* Jayaparvati—; *Haldwani:* Harsingar—; *Hindi:* Har, Harsinghar, Karasli, Kuri, Binari, Saherwa, Saihari, Seoli, Siharu—; *Hoshangabad:* Siralu—; *Java:* Sarigading—; *Khawar:* Samsihar—; *Khond:* Dor, Gunjoseyoli, Kalangreti—; *Kalami:* Kokra, Saparung—; *Konkani:* Pardic, Parizatak, Parzonto, Parzot—; *Malayalam:* Mannappu, Parijatakam—; *Marathi:* Kharasli, Khurasli, Parijtak, Parizatak, Parzonto—; *Mundari:* Kulamarsal—; *Nimar:* Shiralli—; *Portuguese:* Arvore de noute, Arvore triste—; *Punjab:* Harsinghar, Kuri, Laduri, Pakura, Shaili—; *Ramnagar:* Harsingar—; *Sanskrit:* Atyuha, Harashingarpushpaka, Kharapatraka, Nalakunkuma, Parijata, Prajakta, Ragapushpi, Rajanihasa, Sephali, Sephalika—; *Santal:* Saparam—; *Saora:* Krishnavetti—; *Sinhalese:* Sepalika—; *Spanish:* Arbol triste—; *Tamil:* Manjatpu, Parisadam, Pavalamalligai, Sudam, Tira—; *Telugu:* Kapilanagadustu, Karuchiya, Krishnaveni, Krishnaverri, Pagadamalle, Parijatamu, Sepali, Sepalika, Svetasurasa—; *Tulu:* Parijata—; *Urdu:* Gulejafari, Harsingar—; *Uriya:* Godokodiko, Gunjoseyoli, Singaroharo—.

FRAXINUS Tourn. ex Linn.

Deciduous trees. Leaves opposite, imparipinnate, rarely simple. Flowers small, polygamous or dioecious, in lateral or terminal panicles or racemes; bracts caducous. Calyx small; 4-toothed or 0. Corolla 0 or of 4, rarely 2 or 5, petals which are often united in pairs by the stamens. Stamens 2, attached near the base of the petals or subhypogynous. Ovary usually 2-celled; ovules 2 in each cell; style bifid. Fruit a winged nut, 1-seeded, winged at the top.—Species 60.—N. hemisphere, especially N. America, E. Asia, and Mediterranean.

1. Petals 2-4 .... 1. *F. floribunda.*
2. Petals absent .... 2. *F. excelsior.*

Bark tonic febrifugal; leaves cathartic; manna gentle laxative.

The following species are used medicinally in Europe—*F. angustifolia* Vahl, *F. excelsior* Linn., *F. ornus* Linn.—; in China and Malaya—*F. bungeana* A. DC.—; in North America—*F. americana* Linn., *F. excelsior* Linn.—.

OFFICIAL:—The manna from *F. excelsior* Linn. (Belgium); *F. Ornus* Linn. (Austria, Belgium, Denmark, France, Germany, Hungary, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States);=*Ornus europaea* Pers. (Portugal); *F. rotundifolia* Miller (Italy, Spain);=*Ornus rotundifolia* Pers. (Portugal).

1. **Fraxinus floribunda** Wall. in Roxb. Fl. Ind. ed. Carey I (1820) 150.—PLATE 595A.

A large tree. Leaves odd-pinnate; leaflets 7-9, opposite, stalked, ovate-oblong, 12.5 by 4.5 cm., toothed, long-pointed. Flowers small, polygamous, mostly 2-sexual, in terminal panicles 15-20 cm. long. Calyx short, 4-toothed. Petals 4, white, narrowly oblong, much longer than the calyx, cohering at the base in pairs. Stamens longer than the petals, attached to their base. Ovary minute; style short, stigma very long, fleshy, erect. Fruit a narrow, winged, 1-seeded nut 2.5-3.8 cm. long.

Distribution: Temperate and subalpine Himalaya, 5,000—11,000 ft., from Kashmir to Bhutan, Assam, Khasia Hills.

Manna is obtained by incision from the stem. It is used for its sweeting and slightly laxative properties.

Afghanistan: Banarish—; *English:* Himalayan Ash, Nepal Ash—; *Nepal:* Kangu, Tuhasi—; *North-Western Himalayas:* Ango, Angu, Sum—; *North-Western Provinces:* Angan, Angu, Dakkuri—; *Punjab:* Angu, Hamer, Hum, Shun, Sum, Sunnu—.

2. **Fraxinus excelsior** Linn. Sp. Pl. (1753) 1057.—PLATE 595B.

A large deciduous tree; bark grey, thick; twigs minutely pubescent when young, buds black. Leaves often in whorls of 3, 18-30 cm. long, rhachis channelled. Leaflets (3-) 5-7 (-9), 5-12.5 by 2-5 cm., oblong, oblong- elliptic or -lanceolate, acuminate, serrate, hairy along the midrib beneath, otherwise glabrous when mature, sessile. Flowers appearing before the leaves on shoots of the previous year in the axils of the fallen leaves, in racemes which are solitary or paired; rhachis (in fruit) 2.5-15 cm. long. Calyx and petals 0. Filaments very short. Fruit 3.8-5 cm. by 7.5-9 mm., narrowed from about the middle, apex acute, obtuse or emarginate.

Distribution: W. Himalaya, 8,000—10,000 ft.—Caucasus to Europe.

The tree yields Manna. The bark has a tonic febrifugal action, and the leaves are almost as cathartic as those of Senna, producing an unequivocal action upon the kidneys.

Catalan: Freixa comu—; *Dutch:* Essenboom—; *English:* Ash, Common Ash—; *French:* Frêne, Frêne commun, Frêne élevé, Fresne, Grand frêne—; *German:* Esche, Hochesche, Wundholzbaum—; *Greek:* Melia—; *Hungarian:* Korisfa—; *Irish:* Fuinseog—; *Italian:* Frassino, Frassino comune—; *Polish:* Iesion—; *Portuguese:* Freixo—; *Punjab:* Kum, Sum—; *Roumanian:* Frasin—; *Russian:* Yacen—; *Spanish:* Fresno comun, Fresno de Viscaya—.

SCHREBERA Roxb.

A tree. Leaves opposite, unequally pinnate. Flowers in terminal 2-3-chotomous compound cymes; bracts small. Calyx tubular-campanulate, irregularly 4-7-lobed. Corolla salver-shaped;

tube cylindric; lobes imbricate in the bud, 4-7, patent. Stamens 2, near the top of the corolla-tube; filaments short. Ovary 2-celled; style cylindric, shortly 2-lobed; ovules 3-4 in each cell, pendulous from its apex. Capsule obovoid, 2-celled, loculicidally 2-valved, woody. Seeds pendulous, winged, albumen 0; cotyledons plano-convex or contorted, radicle superior.—Species 6.—Africa, India.

The genus is therapeutically inert.

1. **Schrebera swietenioides** Roxb. Corom. Pl. t. 101; Wight Ill. t. 162; Bedd. Fl. Sylv. t. 248.

A middle sized deciduous tree, branches grey. Leaves imparipinnate; leaflets opposite, 3-4 pairs, entire, ovate, base often unequal-sided; blade 7.5-12.5 cm., petiole 6-13 mm., branchlets thickened at nodes and common petioles thickened at the insertion of leaflets. Flowers yellowish brown, fragrant at night, in terminal trichotomous corymbose compound cymes, calyx campanulate, teeth 5, unequal. Corolla 8-13 mm. long, lobes 5-7, on the upper side with brown glandular raised dots. Capsule pendulous, pear-shaped, 5-7.5 cm. long, 2-valved, seeds 8, ending in long wings, albumen 0, radicle short, superior, cotyledons fleshy, longitudinally plaited.

Distribution: Sub-Himalayan tract from Kumaon eastwards, Central India, Rajputana, Burma.

The root is used in leprosy.—The leaves are bitter, acrid; appetiser, stomachic, anthelmintic; useful in urinary discharges, " vata " and " kapha ", enlargement of the spleen, diarrhœa, anæmia, anal troubles (Ayurveda).

Bengal: Ghantaparul—; *Bhil:* Mokkak—; *Bombay:* Mokagantha—; *Bundelkhand:* Ghantapatali, Patali—; *Burma*: Thitswelwe—; *Canarese:* Bula, Ganta, Kalgante, Maggante—; *Central Provinces:* Moka—; *Coorg:* Kalgante—; *Gond:* Dhakha, Kaundi, Mokha—; *Gujerati:* Markho, Naktinunjhad—; *Hindi:* Banpalas, Gantha, Ghant, Goki, Moka—; *Khond:* Moko—; *Kolami:* Jarjo, Sandapsing—; *Kurku:* Jhan—; *Lambadi:* Dathabiro—; *Marathi:* Moka Mokadi, Nakti—; *Mundari:* Cabsing, Sandabsing—; *Rajputana:* Jhaw, Mokha—; *Ramnagar:* Banda—; *Sanskrit:* Ghantapatali, Golidha, Mahakapittha, Mokshaka, Mushka, Mushkaka—;

Tamil: Magalingum, Mogalinga—; *Telugu:* Bullakaya, Magalinga, Makkammokob, Mokkalappa, Mokkampa, Mokkanu, Mukkidi, Tonda-mukkidi—; *Tulu:* Kalgante—; *Uraon:* Ghato—; *Uriya:* Ghontia, Jantia, Nemibula—.

OLEA (Tourn.) Linn.

Trees or shrubs. Leaves opposite, entire or toothed. Flowers small, hermaphrodite, dioecious or polygamous, in axillary or extra-axillary (rarely terminal) panicles. Calyx short, 4-toothed or 4-fid. Corolla-tube usually short; lobes 4, induplicate-valvate, or 0. Stamens usually 2, inserted on the corolla-tube (in male flowers sometimes hypogynous); filaments short; anthers oblong. Ovary 2-celled; ovules 2 in each cell, attached laterally to the septum or sub-pendulous; style short; stigma capitate or bifid. Drupe ellipsoid or subglobose; endocarp bony or crustaceous. Seed usually solitary, pendulous; almuben usually fleshy; radicle short, superior.—Species 35.—Mediterranean, Africa, Indo-Malaya, Australia, New Zealand, Polynesia.

1. Panicles short, axillary. Leaves oblong .... 1. *O. cuspidata.*
2. Nearly related to *cuspidata* but the Indian trees have a laxer inflorescence; the upper side of the leaves is deep glossy-green, the under side is red or ferruginous instead of white .... 2. *O. europea.*
3. Panicles mostly terminal. Leaves rhomboid-lanceolate, entire; nerve-axils glandular .... 3. *O. glandulifera.*
4. Panicles axillary, glabrous. Leaves elliptic-lanceolate, toothed or entire, coriaceous .... 4. *O. dioica.*

Bark bitter and astringent; gum vulnerary; oil demulcent, emollient, and laxative.

O. europaea Linn. is used medicinally in Europe; *O. verrucosa* Link. in South Africa.

OFFICIAL:—The fruit of *O. europaea* Linn. (Austria, Belgium, Denmark, France, Germany, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, Turkey, United States).

The leaves and fruit of *O. europaea* Linn. var. *β. sativa* De Cand. (*O. sativa* Hoffmseg. & Link.) in Portugal.

1. **Olea cuspidata** Wall. Cat. (1828) no. 2817.—PLATE 596.

A medium sized evergreen tree; bark smooth when young, exfoliating when old in long narrow irregular strips; young shoots, petioles and leaves beneath clothed with minute reddish scales. Leaves 5-10 by 1.3-2.5 cm., oblong-lanceolate, entire, cuspidate, coriaceous, dark green and shining above, lateral nerves invisible on the lower surface of the leaf, obscure on the upper; petiole 2.5-5 mm. long. Flowers 6 mm. across, whitish, bisexual, in axillary trichotomous panicles about half as long as the leaves; pedicels mostly 0; bracts minute, linear, caducous. Calyx 1.2 mm. long, cup-shaped, subtruncate. Corolla-tube short, lobes spreading, ovate, subacute, 2.5 mm. long. Anthers oval, cells separated by the broadly elliptic connective, dehiscing laterally. Style short; stigma large, thickened, bifid. Drupe 5-7.5 mm. long, ovoid, supported by the persistent calyx, black when ripe, pulp scanty, endocarp bony.

Distribution: N.-W. Himalaya and Kashmir, 2,000—6,000 ft., Salt Range, Trans-Indus, Waziristan, Baluchistan.—Afghanistan.

The root is a good application for scorpion-sting; its ashes are useful in rheumatism and diseases of the brain.—The fruit is tonic, emmenagogue; appetiser; useful in biliousness, liver complaints, scabies, thirst, burning of the eyes, caries of the teeth, toothache.—The oil has a bad taste; purgative, tonic, alexiteric; useful in griping, liver troubles, pains in the joints, rheumatism, lumbago, old wounds; the oil from green fruits is astringent and a good tonic for old people (Yunani).

At Wad, in Baluchistan, the fruit is considered somewhat purgative; the gum from the tree is used mixed with antimony in applications to the eye. At Las Bela, the leaves are considered as a cure for gonorrhœa, and the gum as a cure for eye-diseases (Hughes-Buller).

An oil is extracted from the fruit and is used medicinally as a rubefacient. The leaves and bark are bitter and astringent, and used as an antiperiodic in fever and debility (Brandis).

Almora: Kaphlainj—; *Arabic:* Sjetun, Zeitun—; *Garhwal:* Bairbanj—; *Hindi:* Kahu, Kan, Kau—; *Jaunsar:* Kau—; *Kila Saifulla:* Showan, Showanah—; *Kohlu:* Kato—; *Kunawar:* Wi—;

Las Bela: Kato—; *Loralai:* Shrun—; *North-Western Himalayas:* Kaho, Kahu, Kan, Kao—; *Persian:* Zaitun—; *Punjab:* Kan, Kao, Kau, Ko, Kohu—; *Pushtu:* Kao, Shawan, Trikhshawan, Zaitun—; *Sibi:* Kahu, Showan—; *Sind:* Khan, Khau—; *Urdu:* Zaitun—; *Wad:* Khot—.

2. **Olea europæa** Linn. Sp. Pl. (1753) 8.

Nearly related to O. Cuspidata but the Indian trees have a laxer inflorescence, the upper side of the leaves is deep glossy green not grey or dull green, the under side is red or ferruginous instead of white; the fruit is smaller, there are no spines and the heart-wood is more distinctly marked.

Distribution: Baluchistan.—Indigenous in the Mediterranean region and Orient.

The bark is bitter and astringent, and has had a great reputation as a substitute for cinchona.

The oil from the pericarp is a well-known demulcent, emollient, and laxative. It enters extensively into the preparation of plasters, liniments, cerates, ointments, and enemas.

The tree also yields a gum-like substance which is considered vulnerary.

Arabic: Zaytoun—; *Canarese:* Julipe—; *Catalan:* Olivera—; *Danish:* Oljetroee—; *Dutch:* Olijfbloom—; *English:* Olive Tree—; *French:* Olier, Olivier—; *German:* Olivenbaum—; *Greek:* Elaia—; *Hebrew:* Zayit—; *Italian:* Olivo, Ulivo—; *Languedoc:* Boutaillaou, Bouteillaou—; *Maltese:* Zebbug—; *Polish:* Oliwa drzewo—; *Portuguese:* Oliveira—; *Roumanian:* Maslin—; *Russian:* Oliva—; *Spanish:* Aceituno, Olivo—; *Swedish:* Oljetroeed—; *Tamil:* Saidun—; *Telugu:* Jaitun—.

3. **Olea glandulifera** Wall. Cat. (1828) no. 2811.—Plate 597.

A small or medium sized evergreen tree; bark grey, uneven, exfoliating in brittle scales; twigs lenticellate, glabrous. Leaves 7.5-15 by 3.8-6.3 cm., lanceolate, ovate- or oblong- lanceolate, long acuminate, entire, glabrous, lateral nerves slender, easily visible on both surfaces, glandular in the axils beneath; petiole 1.3-2.5 cm.

long. Flowers 7.5 mm. across, white, bisexual, in terminal and axillary trichotomous panicles up to 10 cm. long and broad; pedicels 1.2-5 mm. long or almost 0; bracts minute. Calyx 1.2 mm. long, 4-toothed, teeth ciliate. Corolla-tube short, lobes spreading, oblong, 3.8 mm. long. Anthers large, oval, cells separated by the broadly elliptic connective, dehiscing laterally. Style short; stigma large, globose. Drupe 7.5-13 mm. long, oblique, ellipsoid, seated on the persistent but inconspicuous calyx, black when ripe, endocarp bony.

Distribution: N.-W. Himalaya, 2,000—6,000 ft., from Kashmir to Nepal, N. Circars, hills of Ganjam and Vizagapatam, Deccan, Mysore, W. Ghats of Madras Presidency.

The bark and leaves are astringent and used as an antiperiodic in fever (Atkinson).

Almora: Garura—; *Badaga:* Kunde—; *Garhwal:* Gaild, Gair—; *Jaunsar:* Gaild, Gair—; *Kumaon:* Gair, Galdu, Garur—; *Malkot:* Gaild, Gair—; *Punjab:* Gulili, Phalsh, Raban, Sira—; *Saora:* Lodajang—.

4. **Olea dioica** Roxb. Hort. Beng. (1814) 3; Wight Ill. t. 151.

A small or moderate sized glabrous tree; bark grey, smooth. Leaves coriaceous, 7.5-12.5 by 3.2-5 cm., elliptic-lanceolate, acute or acuminate, entire or distantly and sharply serrate, waved, glabrous, base acute, running down into the petiole; main nerves 8-10, slender, conspicuous beneath; petioles 6-13 mm. long. Flowers polygamo-dioecious (male and hermaphrodite) in compound panicles 2.5-7.5 cm. long, which are axillary or leaf-opposed or from below the leaves, the male panicles rather larger and more dense than the hermaphrodite ones. Male flowers: Calyx 0.1 mm. long, glabrous; lobes triangular, acute, 0.08 mm. long. Corolla 3 mm. long; lobes 0.08 mm. long, triangular-ovate, subacute. Filaments short. Hermaphrodite flowers: Calyx and corolla as in the male; stamens usually 2 (sometimes 3); filaments inserted on the corolla or sometimes on the ovary (epigynous). Drupe 13-17 mm. long, ellipsoid, often slightly pointed, purple and covered with a whitish powdery bloom when ripe. Seed ellipsoid, shortly pointed, rugose, glabrous, intensely bitter to the taste; testa thin; cotyledons oblong-elliptic, flat.

Distribution: Lower hills of Assam and Bengal, W. Peninsula.

The bark is used as a febrifuge in the Central Provinces.

Bengal: Attajam—; *Bombay:* Parjamb—; *Canarese:* Baranuke, Bilisarali, Edala, Hakkasarali, Kunde, Mahodale, Mudla, Parujambu—; *Central Provinces:* Kulumb—; *Kadir:* Manidalai, Paravanidalai—; *Malayalam:* Etala, Irippa, Karivetti, Valiyavetila, Vetila—; *Marathi:* Karambu—; *Nepal:* Kalakiamoni—; *Tamil:* Idalai, Kanaipporumbalu, Koli, Kuraikkal, Payir—.

SALVADORACEAE.

Shrubs or trees, usually glabrous, unarmed or spinous. Leaves opposite, entire; stipules minute or 0. Flowers small, hermaphrodite or dioecious, in panicled spikes or racemes. Calyx free, campanulate or ovoid, 3-4-toothed or 4-fid. Corolla gamopetalous, or petals free, 4-merous, shortly campanulate, imbricate in bud. Stamens 4, inserted on the corolla-tube or near the base of the petals, alternate with the lobes or petals; filaments free or connate at the base; anthers ovate. Disk 0 or of 4 glands alternate with the filaments. Ovary superior, 1-2-celled; ovules 1-2 in each cell, erect from its base, anatropous; style short; stigma 2-fid or subentire. Berry or drupe usually 1-seeded. Seed erect, globose or compressed; testa thin or cartilaginous; albumen 0; cotyledons fleshy, plano-convex.—Genera 3. Species 8.—Asia, Africa.

1. Corolla gamopetalous. Stamens on corolla-tube. Ovary 1-celled, 1-ovuled .... SALVADORA.
2. Petals free. Stamens free. Ovary 2-celled .... AZIMA.

They exhibit acrid and vesicant, stimulant and tonic properties.

SALVADORA Garcin. ex Linn.

Shrubs or trees. Leaves opposite, entire, usually pale. Flowers small, sessile or pedicellate, along the branches or axillary or terminal panicles. Calyx campanulate, 4-fid. Corolla campanulate; tube short; lobes 4, obtuse, imbricate in bud. Stamens 4, inserted at the

base or in the middle of the corolla-tube; filaments slightly flattened. Disk of 4 scales or glands between the bases of the filaments or 0. Ovary 1-celled; ovule solitary; style very short or almost 0; stigma broad, truncate or subpeltate. Drupe globose, supported by the persistent calyx and corolla; endocarp crustaceous. Seed erect, globose.—Species 2.—East Africa, Arabia, India.

1. Leaves 20 mm. and more broad. Flowers pedicelled .... 1. *S. persica.*
2. Leaves less than 20 mm. broad. Flowers sessile .... 2. *S. oleoides.*

The two species of the genus are used medicinally.

1. **Salvadora persica** Linn. Sp. Pl. (1753) 122.—*S. indica* Wight Ill. t. 181.—Plate 598.

A large much-branched evergreen shrub or small tree with soft whitish yellow wood; bark of old stems rugose; branches numerous, drooping, glabrous, terete, finely striate, shining, almost white. Leaves somewhat fleshy, glaucous, 3.8-6.3 by 2-3.2 cm., elliptic-lanceolate or ovate, obtuse and often mucronate at the apex; base usually acute, less commonly rounded; main nerves 5-6 pairs; petioles 1.3-2.2 cm. long, glabrous. Flowers greenish yellow, in axillary and terminal compound lax panicles 5-12.5 cm. long, numerous in the upper axils; pedicels 1.5-3 mm. long; bracts beneath the pedicels ovate, very caducous. Calyx 1.25 mm. long, glabrous, cleft ½-way down; lobes rounded. Corolla very thin, 3 mm. long, deeply cleft, persistent; lobes 2.5 mm. long, oblong, obtuse, much reflexed. Stamens shorter than the corolla, but exserted, owing to the corolla-lobes being reflexed. Drupe 3 mm. diam., globose, smooth, red when ripe.

Distribution: Drier parts of India, Baluchistan, Ceylon.—Dry regions of W. Asia, Egypt, Abyssinia.

The fruit is sweet; aphrodisiac, alexiteric, stomachic; improves appetite; useful in biliousness.—The oil is digestible; cures "vata" (Ayurveda).

The leaves are bitter; corrective, deobstruent, astringent to the bowels, tonic to the liver, diuretic, analgesic, anthelmintic; useful in ozœna and other nose troubles, in piles, scabies, leucoderma; lessen

inflammation; strengthen the teeth.—The fruit is sweet; aphrodisiac, diuretic, carminative; useful in biliousness.—The seeds have a bitter sharp taste; purgative, tonic to the liver; improve diuresis (Yunani).

The tree derives its Persian name (darakht-i-miswak, or tooth-brush tree) from the fact that the wood is much employed for the manufacture of tooth-brushes, and it is supposed by the Natives that tooth-brushes made of it strengthen the gums, keep them from becoming spongy, and improve digestion.

In Persian works on medicine, the fruit is described as deobstruent, carminative, and diuretic.

The bark of the root is remarkably acrid; bruised and applied to the skin it soon raises blisters.

Ainslie states that the bark of the stem is a little warm and somewhat acrid, and is recommended by Indian physicians to be used as a decoction in low fever, and as a stimulant and tonic in amenorrhœa. The dose of the decoction is half a teacupful twice daily.

The shoots and leaves are pungent, and are considered in the Punjab as an antidote to poisons of all sorts. The juice of the leaves is given in scurvy. The leaves are used by the country-people in the south of Bombay as an external application in rheumatism.

The fruit is said to be administered in Sind with good effect in cases of snake-bite, and to be used both in the fresh and in the dried state, although in the latter it loses much of its efficacy, and has to be administered in considerably larger doses and combined with borax.

The fruit is useless in the antidotal treatment of snake-bite (Mhaskar and Caius).

Arabic: Arak, Irak, Kabbar, Khardal, Kharjal, Pilu, Redif—; *Bengal:* Chhotapilu, Jal, Pilu—; *Bombay:* Kakhan, Pilvu—; *Canarese:* Goni—; *Ceylon:* Uvay, Viyay—; *English:* Tooth-brush Tree—; *French:* Arak—; *Gujerati:* Kharijal, Kharijar, Motijalya, Pilu, Piludi—; *Hindi:* Badapilu, Chhotapilu, Jal, Pilu—; *Kyika:* Mjungumatu—; *Marathi:* Khakhin, Kickni, Miraj, Mirajoli, Pilu, Rhakhan, Thorapilu—; *Nasirabad:* Kabbar—; *North-Western Provinces:* Jal—; *Persian:* Darakhtimisvak, Misvak—; *Punjab:* Arak,

Chhotavan, Jhal, Jhar, Jhit, Jit, Kaurijal, Kaurivan, Pilu—; *Pushtu:* Plewan—; *Rajputana:* Jal, Jhal—; *Sanskrit:* Brihatpilu, Gauli, Langhupilu, Madhupilu, Mahaphala, Mahapilu, Mahavriksha, Pilu, Rajapilu—; *Sind:* Kabbar, Kharidjai, Pilu—; *Sonrai:* Hiro—; *Swahili:* Msuaki—; *Tamil:* Kalarva, Kargol, Kargoli, Opa, Perungoli, Surugalarva, Sittuvila, Uba, Uga—; *Telugu:* Ghunia, Gogu, Gone, Goniya, Karugogu, Peddavaragogu, Pinnavaragogu, Varagogu, Varagoki—; *Tigré:* Addai—; *Tigrinia:* Addai—; *Urdu:* Pilu—; *Uriya:* Kotungo, Toboto—.

2. **Salvadora oleoides** Decaisne in Jacquem. Voy. Bot. (1844) 140. t. 144.—Plate 599.

A shrub or occasionally a small tree with a short twisted or bent trunk; branches numerous, stiff, divergent, whitish. Leaves 3.8-7.5 cm. by 3-13 mm., whitish green, coriaceous and somewhat fleshy when mature, linear-lanceolate or elliptic-lanceolate, acute or subobtuse, often mucronate, glabrous; main nerves indistinct; petioles 4-6 mm. long. Flowers greenish white, sessile, in erect axillary panicled spikes 2.5-3.8 cm. long, often clustered. Calyx 1.5-2 mm. long, cleft about ½-way down; lobes 4, rounded, obtuse. Corolla a little longer than the calyx, deeply cleft; lobes obovate-oblong, obtuse. Drupes 4-5 mm. diam., subsessile, globose, yellow when ripe.

Distribution: Gujarat, Sind, Baluchistan, Punjab, Rajputana.—Arabia.

The fruit has a sharp, pungent, acrid and sweet, sour taste with a flavour; appetiser, laxative, carminative, alexipharmic; useful in piles, tumours, bronchitis, diseases of the spleen, ascites (Ayurveda).

The root bark is used as a vesicant.

The leaves *Rasuna* resemble the lanceolate senna, and are purgative (Honigberger). They are given in decoction to horses.

In Las Bela, the leaves are used as a cure for coughs and as a purgative (Hughes-Buller).

The fruit is sweet in taste, and is supposed by the natives of the Punjab to have aphrodisiac properties. The fruits eaten singly are said to cause tingling and small ulcers of the mouth, hence people

prefer to eat them by handfuls, seeds and all, and the latter are apt to accumulate in masses in the sigmoid flexure of the intestines and lead to disagreeable results.

The oil obtained from the seeds by expression, is used as a stimulating application in painful rheumatic affections and after child-birth.

The seeds are not an antidote to snake-venom (Mhaskar and Caius).

"Khakan Fat" has been examined chemically by Patel, Narayanaiyer, Sudborough, and Watson (*Journ. Ind. Inst. Sc.; IX*, 1926).

Arabic: Arak—; *Bombay:* Kakhan, Kankhina—; *Drug:* Plawan—; *Gujarat:* Khakan, Khakananutela, Mitijal, Mitijar, Pilava, Pilu, Vakhadia—; *Hindi:* Bahapilu, Chhotapilu, Jal, Jhal—; *Jhalawan:* Kator—; *Kohlu:* Pilu—; *Kotra:* Khabar—; *Las Bela:* Jar—; *Makran:* Karuch—; *Marathi:* Godpilu, Khakan, Pilu—; *Nasirabad:* Pilu—; *North-Western Provinces:* Diar, Jhal, Kubbur—; *Persian:* Darakhimisvak—; *Punjab:* Diar, Jal, Jhal, Kubbur, Pil, Sal, Tak, Van, Vani, Wan—; *Pushtu:* Miswak, Plewan—; *Sanskrit:* Dhani, Gudaphala, Kallabhavallabha, Karavallabha, Laghupilu, Pilu, Piluka, Shakhi, Shitasaha, Shyama, Sransi, Virechanaphala—; *Shahrig:* Khabar—; *Sibi:* Pilo, Pilu—; *Tamil:* Kalawa, Karkol—.

AZIMA Lam.

Glabrous, much-branched or sarmentose shrubs armed with axillary spines. Leaves opposite, entire. Flowers dioecious, small, crowded in the axils or sessile along the branches of the small slightly branched panicle. Calyx campanulate, 4-fid, or, in the female flowers, irregularly 2-4-partite. Petals 4, free, narrow, imbricate in bud. Stamens 4, alternate with the petals; filaments slender; anthers ovate. Scales or glands 0. Ovary 2-celled; ovules 1 or 2 in each cell, erect from the base; stigma subsessile, large. Berry globose. Seeds 1-2, globose; albumen 0.—Species 3.—S. Africa to the Philippines.

The root and leaves are stimulant and tonic.

1. **Azima tetracantha** Lam. Encycl. Méth. I (1783) 343.—Plate 600.

A low spinous rigid bush, woody below only; branches numerous, green, herbaceous, bluntly quadrangular, the younger pubescent. Leaves 2.5-4.5 by 1.3-2 cm., elliptic, acute, sharply mucronate, rigid, pale, glabrous, shining, base acute; petioles 3 mm. long. Spines often 3.2 cm. long, obtusely quadrangular, grooved, very sharp, with an indurated point, slightly pubescent when young, at length glabrous, usually 4, sometimes reduced to 1 and occasionally as many as 7 at a node. Flowers small, greenish white or yellowish, sessile in axillary fascicles, the supporting leaves of the upper fascicles reduced to bracts or becoming obsolete, so that the flowering branches end in naked interrupted spikes; bracts foliaceous, pubescent, ovate, acute, spinous-pointed. Male flowers numerous, crowded in axillary fascicles. Calyx pubescent, 2.5-3 mm. long; lobes 4, ovate, acute, 1.25 mm. long. Petals a little exserted beyond the calyx-lobes, linear-lanceolate, acute, ciliolate. Female flowers solitary or in pairs. Calyx pubescent, 4 mm. long; lobes usually 2, broadly ovate, apiculate, 3 mm. long. Petals as in the male. Ovary 2-celled, glabrous; ovules solitary (rarely 2) in each cell; stigma nearly sessile, 2.5 mm. diam., 2-lobed. Berry 6 mm. diam., globose, glabrous, white, edible, usually 1-seeded.

Distribution: Konkan, Deccan, S. M. Country, Circars, Carnatic, Ceylon.—Tropical and S. Africa.

The leaves, root, and milky juice are bitter and are used medicinally by the Hindus.

The root bark is used in muscular rheumatism.

The leaves are considered stimulant, and are given to puerperal women immediately after confinement. They are administered in the following manner by the villagers:—The leaves with an equal quantity of Neem leaves, and a little powdered brick, are finely ground and given twice a day for the first two days, no food being allowed. For the next six days the woman gets a little boiled rice and pepper water once a day, and is allowed to drink a little warm water after the meal; she is not allowed to sleep after her food during the day,

and if thirsty must quench her thirst by eating betel leaves and areca nut. From the seventh day she gets her ordinary food. It is also the practice among the rural classes to give 2 or 4 ounces of Neem oil soon after delivery; with a little roasted assafœtida, and the woman is made to take daily for a month from the morning of the third or fourth day a bolus of a stimulating confection, which is supposed to keep off cold from the system.

The leaves are also administered with food as a remedy for rheumatism, and their juice to relieve cough. They are used for ulcers; especially after small-pox.

The root is considered to have the same properties as the leaves, and to be also diuretic; it is given in dropsy as along with other drugs.

A decoction of the root, leaves, and bark, with an equal quantity of *Acorus calamus*, ajowan seeds, and salt is recommended as a remedy for chronic diarrhœa and 1 to 1½ ounces of the juice obtained from the root bark, with three ounces of Goat's milk, twice a day as a diuretic in dropsy.

Bengal: Trikantagati—; *Canarese:* Bilivuppi, Esagelemale, Esagelemuttu, Hallusunde, Mullukari, Uppugobe—; *Ceylon:* Ichanku, Iyanku—; *Deccan:* Sukkapat—; *Hindi:* Kantagurkamai—; *Madras:* Sanganjedi—; *Malayalam:* Sankunkuppi—; *Sanskrit:* Kantangur, Kundali, Trikantajata—; *Tamil:* Anji, Isangu, Kandagachangam, Kanniram, Karavelasangam, Kolachangu, Kundali, Mujangu, Mullu-changu, Muttabalam, Nirchangu, Sangu, Solam, Tudiyanji, Uvar-changam—; *Telugu:* Puttu, Tellavuppi, Telluppi, Uppara—; *Uriya:* Odibhango—.

APOCYNACEAE.

Trees or erect or twining shrubs, rarely herbs. Leaves simple, opposite or whorled (rarely alternate), quite entire; stipules 0 or sometimes intrapetiolar glands. Flowers hermaphrodite, regular in

terminal or axillary cymes. Calyx inferior, often glandular inside at the base or at the base of the lobes; lobes 5 (rarely 4), imbricate. Corolla gamopetalous, usually rotate or hypocrateriform; lobes 5 (rarely 4), spreading, contorted, and often twisted in bud (very rarely valvate). Stamens 5 (rarely 4), inserted on the corolla-tube, rarely on its mouth; filaments usually short; anthers linear-oblong or sagittate, free or sometimes adhering to the stigma by the connective, cells 2, dehiscing longitudinally, sometimes produced downwards into an empty spur; pollen granular. Disk sometimes concealing the ovary, annular, cup-shaped or lobed, or of fleshy scales or glands or 0. Ovary 1-celled with 2 parietal placentæ or 2-celled with axile placentæ, or of 2 distinct or partially connate carpels; ovules in each cell 2 or few or many and 2-many-seriate, rarely solitary; style 1, simple or divided at the base; stigma various, usually terminated by an entire or more commonly 2-fid apiculus. Fruit a dry or fleshy drupe, berry or samara, or of 2 drupes, berries or follicles. Seeds various, sometimes winged, sometimes with one or both extremities crowned with a pencil of hairs (coma); albumen hard, fleshy or scanty or 0; embryo straight; cotyledons flat, concave, convoluted or contorted; radicle usually superior.—Genera 180. Species 1400.—Mostly tropical, a few temperate.

A. Anthers included, free from the stigma. Ovary of 2 wholly combined carpels, 1-2-celled
  I. Ovary 1-celled .... ALLAMANDA.
  II. Ovary 2-celled with axile ovules
    a. Climbing shrubs. Corolla-mouth with lobed scales ...... MELODINUS.
    b. Erect or stout climbing armed shrubs .... CARISSA.
B. Anthers included, free from the stigma. Ovary of 2 distinct carpels united by the style
  I. Calyx eglandular within. Carpels 1-2-, rarely 4-6- ovuled Leaves usually whorled. Disk present. Albumen even .. RAUWOLFIA.
  II. Calyx glandular within. Carpels 2-, rarely 4- ovuled
    a. Leaves scattered, alternate. Corolla funnel-shaped ...... CERBERA.
    b. Leaves alternate. Flowers large, yellow, funnel-shaped ... THEVETIA.
  III. Calyx glandular within. Carpels 6- ∞ -ovuled
    a. Ovules biseriate
      1. Disk annular or obscure. Seeds winged .... RHAZYA.
      2. Disk of 2 scales. Seeds truncate at both ends ...... LOCHNERA.
    b. Ovules ∞-seriate
      1. Erect trees. Leaves scattered alternate. Seeds winged .... PLUMIERIA.

2. Erect trees or shrubs. Leaves whorled. Seeds comose. Style distinct .... ALSTONIA.
3. Erect trees. Leaves opposite. Seeds comose. Style short .... HOLARRHENA.

IV. Calyx glandular within. Carpels ∞ -ovuled
Erect trees or shrubs .... ERVATAMIA.

C. Anthers included or exserted. Ovary of 2 distinct carpels united by the style. Fruit of 2 follicles. Seeds comose at one or both ends (exceptions: see PARSONSIA)

I. Corolla rotate or salver-shaped, throat naked (except WRIGHTIA). Anthers more or less exserted
a. Corolla-lobes valvate. Carpels connate in flower .... PARSONSIA.
b. Corolla rotate, mouth naked. Connective thickened at the back .... VALLARIS.
c. Corolla rotate or salver-shaped, mouth with scales ...... WRIGHTIA.

II. Corolla throat broad with 5-10 scales. Anthers included
Shrubby, erect. Leaves whorled. Corolla-lobes short. Follicles erect .... NERIUM.

III. Corolla various, mouth naked. Anthers included
a. Corolla small or medium-sized, salver-shaped, lobes nearly straight or slightly twisted to the left in bud
Ovary hidden or not in the disk. Seeds ovate or oblong .... AGANOSMA.
b. Corolla small, salver-shaped, lobes sharply twisted to the left in bud, tips not deflected
1. Ovary exserted from the disk. Seeds not beaked .... TRACHELOSPERMUM
2. Ovary hidden in the disk. Seeds ovate, beaked .... ANODENDRON.
c. Corolla small, salver-shaped, lobes sharply twisted to the left in bud with the tips deflected
Seeds ovate, beaked .... ICHNOCARPUS.

The root is emetic; the bark bitter and astringent; the leaves cathartic; the milky juice acrid and irritant.

Among the products obtained from the members may be mentioned:—1. alcohols—kanerol—; 2. acids—butyric, formic, linolic, oleic, palmitic, stearic—; 3. sugars—glucose—; 4. alkaloids—ajmaline, ajmalicine, ajmalinine, rauwolfine, serpentine, serpentinine, alstonidine, alstonine, porphyrine, porphyrosine, ditamine, echitamine, echitenine, alstonamine, conessimine, conessine, kurchine, kurchicine, holarrhenine, holarrhimine, holarrhine, norconessine, oleandrine, incine, aspidospermine, ibogaine, paytamine, paytine, yohimbene, yohimbenine, yohimbine, isoyohimbine, pseudoyohimbine, trigonelline—; 5. glucosides—androsin, cerberin, cymarin, neriantin, neriin, oleandrin, ouabain, strophanthin, tanghinin, thevetin—; 6. neutral principles—rosaginin, thevetin, thevetoxin—.

OFFICIAL:—Strophanthin (France, Germany, Holland, Italy, Spain, Turkey, United States).

Alyxia stellata Roem. & Schult. (Holland).

Hancornia speciosa Gomez (Spain).

Landolphia spp. (Spain).

Strophanthus spp. (Holland, Sweden); *S. combe* Oliver (Hungary); *S. gratus* Franch. (Belgium),—(Wallich and Hooker) Franchet (Germany, Turkey); *S. hispidus* DC. (Belgium, Italy, Spain, United States),—P. de C. (France); *S. Kombe* Oliver (Belgium, Denmark, Great Britain, Holland, Italy, Japan, Norway, Russia, Spain, Sweden, Switzerland, United States),—Olivier (Austria).

Vahea gummifera Lam., *V. Madagascariensis* Boj. (Spain).

Vinca minor Linn. (France).

MELODINUS Forst.

Evergreen, erect or climbing shrubs. Leaves opposite. Cymes terminal and axillary, flowers rarely 4-merous, white or pale pink. Calyx 5-partite, eglandular within. Corolla salver-shaped, mouth with thick cleft or lobed scales; lobes overlapping to the left. Anthers included, subsessile, lanceolate, cells rounded at the base. Disk 0. Ovary 2-celled, acute; style short, stigma thick 2-fid; ovules many in each cell. Berry globose, pericarp coriaceous or hard. Seeds many, imbedded in pulp, albumen fleshy; cotyledons thin, radicle short.—Species 30.—Indo-Malaya.

The genus is therapeutically inert.

1. **Melodinus monogynus** Roxb. Fl. Ind. II, 56; Wight Ic. t. 394; Bot. Reg. t. 834; Bot. Mag. t. 2527.

A large climber. Leaves chartaceous-coriaceous, oblong or oblong-lanceolate acuminate, base rounded; nerves about 20 pairs, fine horizontal; 11.3-15 cm. long, 3.8-2.5 cm. wide; petioles 5-7.5 mm. long. Panicles terminal, puberulous up to 7.5 cm. long and as wide. Calyx-lobes 5, oblong orbicular, 5 mm. long. Corolla-tube cylindric, 1.3-2 cm. long, villous inside, lobes oblong falcate, round, 13 mm.

long, white, fragrant, with a 2- or 3- lobed scale at base. Berry globose, 7.5 cm. through, orange. Seeds flattened.

Distribution: Sikkim Himalaya, Assam, Sylhet, Khasia Mts., Malay Peninsula.—Timor.

The plant is poisonous to fish.

Khasia: Echalat, Sadulkou—; *Sylhet:* Echalat, Sadulkou—.

CARISSA Linn.

Much-branched spinous shrub, erect, prostrate or climbing. Leaves opposite, small, coriaceous. Flowers in terminal and axillary pedunculate 2-3-chotomous cymes. Calyx 5-partite, rarely glandular within; segments acute. Corolla hypocrateriform; tube cylindric, usually dilated at the top; lobes 5, overlapping to the right in the Indian species. Stamens at the top of the tube, included; anthers obtuse, or apiculate from the produced connective. Disk 0. Ovary 2-celled; ovules 1-4 in each cell, rarely more; style filiform; stigma fusiform or columnar, minutely 2-fid. Berry ellipsoid or globose, 2- or (by suppression) 1-celled. Seeds usually 2, peltately attached to the septum; albumen fleshy; cotyledons ovate; radicle inferior.—Species 20.—Africa, tropical Asia and Australia.

1. Fruit 13 mm. and more .... 1. *C. carandas.*
2. Fruit less than 13 mm. .... 2. *C. spinarum.*

The root and wood are bitter and stomachic, febrifuge and anthelmintic.

The wood of the following species is used medicinally: in Madagascar—*C. madagascariensis* Pet. Th.—; in Mauritius and La Reunion—*C. xylopicron* Pet. Th.—; in Guinea—*C. edulis* Vahl.—; in South Africa—*C. edulis* Vahl. var. *tomentosa* Stapf., *C. grandiflora* A. DC.—.

1. **Carissa carandas** Linn. Mant. I (1767) 52.—PLATE 601.

A large evergreen shrub with a short stem, glabrous except the inflorescence; bark light grey, scaly; branchlets usually alternate, with thin stout sharp horizontal glabrous spines 2.5-3.8 cm. long at

their base; branches usually without spines. Leaves 3.8-7.5 by 2.5-5 cm., coriaceous, elliptic or obovate, obtuse, often shortly mucronate, glabrous and shining, base subacute; petioles 3-6 mm. long. Flowers white, scarcely odourous, in pubescent terminal corymbose cymes; peduncles usually 6-20 mm. long, sometimes almost 0. Pedicels very short; bracts linear, pubescent. Calyx pubescent, cleft rather more than ½-way down; lobes 2.5-3 mm. long, lanceolate, very acute, ciliate. Corolla-tube about 1.3 cm. long swollen and pubescent near the top; lobes 1 cm. long, oblong-lanceolate, acute, often pubescent and ciliolate. Stamens included within the corolla-tube; filaments very short; anthers linear-oblong. Ovary glabrous; ovules 4 in each cell; stigma slightly penicillate at the apex. Fruit 1.3-2.5 cm. long, ellipsoid, purplish black when ripe, smooth, 4- or more- seeded.

Distribution: Throughout India, Ceylon.—Java, Timor.

The root is anthelmintic.—The fruit is sour, tasty; allays thirst; heating; causes biliousness, "kapha", and blood impurities; when ripe, cooling, cures biliousness and "vata" (Ayurveda).

The fruit is sour, acrid; astringent, appetiser, antipyretic; lessens thirst, biliousness; useful in diseases of the brain; causes indigestion; makes one lethargic; diminishes sexual power (Yunani).

The unripe fruit is astringent, and the ripe fruit is cooling, acid and useful in bilious complaints.

The fruit has been reported by several medical officers to possess antiscorbutic properties.

The root has the reputation of being a bitter stomachic. Used in Konkan, pounded with horse urine, lime-juice and camphor as a remedy for itch.

In Cuttack, the decoction of the leaves is very much used at the commencement of remittent fever.

Bengal: Bainchi, Karamcha, Karenja, Kurumia, Tair—; *Bombay:* Hartundi, Karanda, Karinda, Karunda, Karwand, Korinda—; *Canarese:* Doddakavali, Heggarichige, Hirikavali, Karekayi, Kariche, Karichinakayi, Karande, Kavali, Kawliballi—; *Central Provinces:* Gotho—; *Ceylon:* Perunkila—; *French:* Calac—; *Gujarat:* Karamadan, Karamadi, Karamarda, Timbarran—; *Hindi:* Garinga, Gotho,

Karaunda, Karonda, Karondi, Karunda, Karrona, Timukhia—; *Konkani:* Carandam—; *Lambadi:* Karndepuli—; *Madras:* Yaneik-kalachedi—; *Malayalam:* Kalavu, Karakka, Karanta—; *Marathi:* Haradundi, Karanda, Karandi, Boronda, Karavanda, Karavandi—; *North-Western Provinces:* Timukhia—; *Sanskrit:* Avighna, Bahudala, Bolekarambuka, Dimdima, Dridhakantaka, Guchhi, Jalipushpa, Kanachuka, Kantaki, Karamarda, Karamardaka, Karamla, Karamlaka, Krishnapakaphala, Krishnaphala, Kshiraphala, Kshiri, Mahakaramba, Pakakrishna, Pakaphala, Panimarda, Phalakrishna, Supushpa, Sushena, Vanalaya, Vanekshudra, Vasha—; *Sinhalese:* Mahakaramba, Mahakaranda—; *Tamil:* Kala, Kalakkay, Perungala—; *Telugu:* Kalive, Kalivi, Peddakalive, Peddavaka, Oka, Okalive, Vaka, Vakalive—; *Urdu:* Karwanah—; *Uriya:* Khyirokoli, Koronda—.

2. **Carissa spinarum** Linn. Mantiss. II, (1771) App. 559.

A spreading evergreen shrub up to 3.6 m. high, armed where the stem branches with opposite straight or forked thorns which arise from between the petioles, thorns up to 3.8 cm. long, sharp, woody. Juice milky, young shoots pubescent. Leaves opposite, 1.3-5 by 0.6-2 cm., elliptic, ovate or suborbicular, usually acute at both ends, mucronate, coriaceous, bright green above paler beneath, puberulous on the midrib on both sides otherwise usually glabrous; petiole about 2.5 mm. long. Flowers about 10 mm. across, white, often tinged with pink, very sweet scented, in pubescent corymbose cymes at the tips or forks of the branches. Peduncles 0-1.3 cm. long, sometimes forked, each branch usually 3-flowered; pedicels 2.5 mm. long; bracts linear, half the length of the pedicels. Calyx scarcely 2.5 mm. long, divided almost to the base; lobes 5, lanceolate, acuminate, ciliate. Corolla-tube slender, 7.5 mm. long, slightly swollen below the top; lobes 5, about half the length of the tube, overlapping to the right, lanceolate, acute, spreading. Stamens 5, at the top of the corolla-tube; filaments very short; anthers apiculate by the produced connective. Disk 0. Ovary syncarpous, 2-celled; ovules 2 in each cell; style filiform, reaching the base of the stamens; stigma minutely 2-fid. Berry ellipsoid, 7.5 mm. long, dull dark purple, full of milky juice, edible.

Distribution: Throughout India, Ceylon.

Its roots in combination with other roots are used in rheumatism by the Mundas of Chota Nagpur. . . . Without any admixture the root is ground and put in the sores of animals wherein worms have bred. It enters also into the composition of purgatives, but if taken internally in too large a dose it proves fatal, causing purging which cannot be stopped. The same root roughly ground and mixed with water drives away snakes by its smell if poured into their holes. It is said that snakes avoid any plot of ground surrounded by a hedge of this plant. It is probably owing to this belief that, in case of snake-bite, the bitten limb is shampooed downwards from the heart with the root well ground and mixed with a little water. This is intended as a remedy and is not considered a superstitious practice (*Encyclopaedia mundarica*).

Canarese: Garji, Kavali—; *Ceylon:* Chirukila, Kilatti—; *Hasada:* Garsul—; *Hindi:* Karaunda—; *Madras:* Kalachedi—; *Marathi:* Karanda, Karwand—; *Naguri:* Gadasur, Garasur—; *Punjab:* Garaunda, Garna—; *Sinhalese:* Hinkaramba—; *Telugu:* Kalivi, Kalli—.

RAUWOLFIA Plum. ex Linn.

Glabrous shrubs. Leaves 3-4-verticillate (rarely opposite). Flowers in few-flowered often umbelliform cymes; peduncles alternating with the terminal leaves, at length becoming lateral. Calyx short, 5-fid or 5-partite, eglandular inside. Corolla hypocrateriform; tube cylindric, inflated over the anthers, usually hairy within; lobes 5, overlapping to the left. Stamens inserted at the middle of the tube or higher up, included; anthers small, subacute, the cells rounded at the base. Disk cup-shaped or annular, entire or shortly lobed. Carpels 2, distinct or connate; ovules 2 in each carpel, collateral; style filiform; stigma thick, broad and often toothed at the apex, annular or appendiculate at the base, tip shortly 2-fid. Fruit of 2 connate or distinct usually 1-seeded drupes. Seeds ovoid; albumen fleshy; cotyledons flat.—Species 50.—Tropics.

The root is bitter and astringent, cathartic and anthelmintic; the bark is emetic, drastic, and febrifuge.

The following species are used medicinally in Macassar and Java—*R. serpentina* Benth.—; in the West India—*R. canescens* Linn., *R. nitida* Jacq.—; in Brazil—*R. canescens* Linn.—; in South Africa—*R. caffra* Sond., *R. natalensis* Sond.—; in the Gold Coast —*R. vomitoria* Afz.—.

The genus is rich in alkaloids. Rauwolfine has been isolated from the bark of *R. caffra;* ajmaline, ajmalinine, ajmalicine, serpentine, serpentinine from the root of *R. serpentina.*

1. **Rauwolfia serpentina** Benth. ex Kurz For. Fl. Brit. Burma. II (1877) 171.—*Ophioxylon serpentinum* Linn. Sp. Pl. (1753) 1043; Wight Ic. t. 849.—Plate 602A.

A small erect shrub rarely reaching, in the Bombay Presidency, 0.9 m. high; bark pale, rarely lenticellate. Leaves in whorls of 3, thin, 7.5-18 by 2.5-6.3 cm., lanceolate, acute or acuminate, glabrous, bright green above, pale beneath, base tapering; main nerves 8-10 pairs, slender; petioles 8 mm. long, somewhat obscure owing to the blade running down into the petiole. Flowers white, often tinged with violet, in many-flowered irregular corymbose cymes; peduncles 5-12.5 cm. long; pedicels stout, 3-6 mm. long, bright red; bracts beneath the pedicels triangular, acute, 1-1.5 mm. long. Calyx glabrous, bright red; segments 2.5 mm. long, lanceolate. Corolla 1-1.3 cm. long, or rarely a little longer; tube slender, swollen a little above the middle; lobes 3 mm. long, elliptic-oblong, rounded at the apex. Disk cup-shaped, membranous, obscurely lobed. Drupes single, or didymous and connate more or less deeply, about 6 mm. diam., purplish black when ripe. The inflorescence of this plant with red pedicels and calyx and white corolla is striking.

Distribution: Sub-Himalayan tract from Sirhind eastwards, Burma, Andamans. Konkan, N. Kanara, S. M. Country, W. Ghats of Madras Presidency, Ceylon.—Java.

The root is bitter, acrid, heating, sharp, pungent; anthelmintic; cures "tridosha", ulcers, the poisonous effects of scorpion-sting and snake-bite (Ayurveda).

A decoction of the root is employed in labours to increase uterine contractions. In Java, it is used as an anthelmintic.

The juice of the leaves is instilled into the eyes by the natives of India and Java, as a remedy for the removal of opacities of the cornea.

In Bombay, most of the labourers who come from the Southern Konkan keep a small supply of the root, which they value as a remedy in painful affections of the bowels. In the Konkan the root with *Aristolachia indica* is given in cholera, in colic, 1 part of the root with 2 parts of *Holarrhena* root and 3 parts of *Jatropha Curcas* root is given in milk. In fever the root with *Andrographis*, ginger and black salt is used. The dose of the combined drugs in each case is from 3 to four tolas.

The root is used by the Mundas as a snake remedy.

The inhabitants of Macassar use the petioles as an antidote for ipoh.

Whether given internally or applied externally the root and leaf are useless in the treatment of snake-bite (Mhaskar and Caius) and scorpion-sting (Caius and Mhaskar).

Siddiqui and Siddiqui have examined the root chemically (*Journ. Ind. Chem. Soc.;* VIII, 1931; IX, 1932). The pharmacological action of *ajmaline* was determined by Chopra, Gupta, and Mukherjee (20th Ind. Sc. Congress; Patna, 1933).

Bengal: Chandra, Chhotachand—; *Bombay:* Amelpodi, Chandra, Chhotachand, Harkai, Karavi, Tchovanna—; *Burma:* Bongmaiza—; *Canarese:* Chandrike, Garudapatala, Sivanabhi, Sutranabhi—; *Hindi:* Chhotachand, Harkaichanda, Nai, Nakulikanda—; *Macassar:* Gaboes, Poele, Poelepandak—; *Malabar:* Amelpodi—; *Malayalam:* Chuvannavilpuri, Tulunni, Vantuvala—; *Marathi:* Harkaya, Harki, Mungusavel, Sapasanda—; *Mundari:* Nagbail—; *Sanskrit:* Ahibhuka, Ahilata, Ahimardani, Bhadra, Bhujangakshi, Chandrasura, Chandrika, Charmahantri, Gandhanakuli, Ishwari, Karavi, Mahaahigandha, Mahasugandha, Nagagandha, Nagasugandha, Nakuladhya, Nakuleshta, Nakuli, Nandani, Patalaganda, Pashumahanakarika, Phanihantri, Raktapatrika, Sarpagandha, Sarpakshi, Sarpangi, Sarvagandha, Sugandha, Surasa, Surpadini, Suvaha, Vasara, Vasupushpa, Vishamardani, Vishamardanika, Vishanashini, Vyalagandha—; *Sinhalese:*

Aikavaireya, Ratekaweriya—; *Tamil:* Sovannamilbori—; *Telugu:* Dumparasna, Patalagandhi, Patalagaruda—; *Uriya:* Sanochado—.

CERBERA Linn.

Small glabrous trees or large shrubs. Leaves alternate or scattered, long; nerves slender, horizontal and parallel. Flowers large, white or red, in terminal cymes. Calyx 5-partite, without glands inside; segments long. Corolla subinfundibuliform; tube short, the throat slightly dilated, ribbed or with pubescent scales inside; lobes 5, broad, spreading, longer than the tube, overlapping to the left. Stamens included; anthers lanceolate, apiculate, the cells rounded at the base. Disk 0. Carpels of the ovary 2, distinct; ovules 4 in each carpel, on both sides of a thick placenta; style filiform; stigma large, ovoid, with 2 truncate points. Fruit usually of 1 (rarely 2) globose ovoid or ellipsoid 1-2-seeded carpels; pericarp very thick, fibrous and woody. Seeds broad, compressed, peltately attached to the enlarged placenta; albumen 0; cotyledons thinly fleshy; radicle very short.—Species 6.—Indo-Malaya, Madagascar.

The bark and leaves are emetic and cathartic; the kernels emetic; the milky sap purgative.

C. odollam Gaertn. is used medicinally in the Philippine Islands and the Malay Archipelago.

1. **Cerbera odollam** Gaertn. Fruct. II (1791) 193; Wight Ic. t. 441.—PLATE 603.

A small tree or large shrub with an acrid milky poisonous juice, glabrous; branchlets whorled, stout, marked with leaf-scars. Leaves alternate, closely set at the ends of the branches, 12.5-25 by 3.8-6.3 cm., coriaceous, black when dry, lanceolate, oblanceolate or oblong-obovate, suddenly acuminate, glabrous, much tapering to the base: main nerves numerous, slender, horizontal, connected by an intra-marginal nerve; petioles 2-3.8 cm. long. Flowers large, white with a yellow throat, odourous, in terminal peduncled paniculate cymes; peduncles 5-15 cm. long; pedicels stout; bracts coloured, 1.3-2.5 cm. long, oblong, acute, caducous. Calyx glabrous; segments 2-2.5 cm.

long, linear-oblong, very acute, recurved. Corolla-tube 1.3-2 cm. long, the upper part dilated, the throat nearly closed by 5 pubescent projecting wing-like ribs; lobes longer than the tube, broadly elliptic, acute, oblique. Ovary of 2 distinct carpels united by a single style. Fruit (from the suppression of 1 carpel) a drupe 5-10 cm. long, subglobose, smooth, green. Seed usually solitary.

Distribution: Throughout India in salt-swamps or on the sea-coast, Ceylon.—Malay Archipelago, China, Australia, Islands of the Pacific.

The bark is purgative.

The nut is narcotic and poisonous. The green fruit is employed to kill dogs. The kernel of the fruit is an irritant poison producing, when taken internally, vomiting and purging, soon followed by collapse and death.

The whole plant is full of an acid milky juice. Emetic and purgative properties are assigned to the milky sap and to the leaves.

The fruit is used as a cure for hydrophobia.

Bengal: Dabur, Dhakur—; *Burma:* Kalwah—; *Canarese:* Chande, Honde, Monde, Tende—; *Celebes:* Goro mata boeta—; *Java:* Betah—; *Madras:* Kadalalari—; *Malay:* Betakbetak—; *Malayalam:* Chattankaya, Ponna, Othalam, Utalam—; *Marathi:* Sukanu—; *Pahang:* Bebuta—; *Paragua:* Arbon—; *Selangor:* Bebuta—; *Sinhalese:* Gonkadura—; *Sundriban:* Dabur, Dakur—; *Tagalog:* Baraybay, Marayabay, Toctoccalo—; *Tamil:* Kadalma, Kattarali, Kattuma, Udalai—; *Ticao:* Lipata—; *Visayan:* Butobuto—.

THEVETIA Linn.

Shrubs with elongated branches and numerous, entire narrow, alternate leaves. Flowers large, yellow, solitary or in few-flowered cymes. Calyx-lobes 5, lanceolate, somewhat spreading. Corolla funnel-shaped, the lower part of the tube cylindric, dilated above, the lobes 5, longer than the tube, somewhat inequilateral. Stamens adnate to the bearded throat of the corolla-tube, the anthers free from the stigma. Disk lobed. Ovary 2-lobed, 2-celled, the cells 2-ovuled. Drupe broader than long, the endocarp hard, 2-celled, 2-4-seeded.—Species 8.—Tropical America, W. Indies.

T. neriifolia Juss. is used medicinally in Philippine Islands, Guiana, Brazil, and the Gold Coast.

Thevetin and thevetoxin, two highly poisonous neutral principles have been isolated from *T. neriifolia.*

1. **Thevetia neriifolia** Juss ex Steud. Nom. ed. 2 II (1841) 680.—*Cerbera thevetia* Linn. Sp. Pl. (1753) 209.

A large, evergreen, glabrous shrub or small tree, 4.5-6 m. high, 15 cm. diam. Juice milky poisonous. Leaves spirally arranged. 7.5-12.5 by 0.6-1 cm., crowded, linear, narrowed at both ends, bright green and shining above, margins slightly recurved; petiole minute. Flowers 5 cm. across, yellow, in few-flowered, terminal cymes. Peduncle usually very short; pedicels about 2.5 cm. long; bracts variable. Calyx 6 mm. long, divided almost to the base; segments 5, narrow, acute, persistent and spreading in fruit, reflexed when the fruit is ripe. Corolla exceeding 5 cm. long, tubular at the base, tube 1.3 cm. long, throat campanulate, limb plicate, lobes 5, overlapping to the left in bud. Corona in the throat of the corolla, of 5 scales arching over the stamens. Stamens 5, inserted at the base of the corolla throat, anthers incumbent on the stigma. Disk thick, cup-shaped, accrescent in fruit. Ovary superior, of 2 free carpels united by their styles; stigma broad, angular; ovules 2 in each carpel. Fruit broadly obovate in longitudinal section 3.2 cm. long, elliptic in a horizontal cross-section 3.8 cm. broad, exocarp fleshy black when ripe, mesocarp bony, longitudinally and transversely divided, endocarp thin, corky; seeds 4 or fewer by suppression.

Distribution: Native of S. America and the W. Indies.—Often planted in India.

The plant is bitter, pungent, acrid, hot; astringent to the bowels; useful in urethral discharges, worms, skin diseases, leucoderma, wounds, piles, eye troubles, itching, fevers, bronchitis; cures "vata"; very poisonous (Ayurveda).

The bark is bitter and cathartic, and a powerful febrifuge useful in various kinds of intermittent fevers.

The milky juice of the tree is highly poisonous; and the kernel is a powerful acro-narcotic poison.

The Mundas use the seeds to poison pigs and jackals.

The oil from the seeds is emetic and purgative.

In the Gold Coast, the seeds are chewed as a purgative.

In Guiana, the seed is used as a purgative in rheumatism and dropsy. It is also considered a good alexiteric and is prescribed with rum.

The oil from the seeds has been chemically examined by Bhattacharya and Ramaswamiayyar (*Journ. Ind. Inst. Sc.;* 1927).

1. One of the active principles of *Thevetia neriifolia* (yellow oleander) is a crystalline glucoside—thevetin.—2. Thevetin is very toxic to frogs, mice, guinea-pigs, cats and higher animals. It has no irritant action locally on the conjunctiva or on the skin or when injected subcutaneously.—3. The glucoside has no action on the digestive enzymes. It has little or no direct effect on the respiration. —4. Thevetin has a direct stimulant action on the plain muscles of the intestine, bladder, vergin uterus, and blood vessels.—5. Thevetin has a pronounced effect on the circulatory system, which resembles in many respects the drugs belonging to the digitalis group.—6. This action appears to be due partly to stimulation of the vagal mechanism and partly to direct stimulation of the cardiac musculature. The action manifests itself either on the nervous or on the muscular elements of the heart according as a small or large dose is administered. It is not possible to state whether conduction of the impulse from auricle to ventricle through the Bundle of His is affected.—7. The glucoside, on account of its cardiotonic properties, should be a potent therapeutic agent, but the margin between the therapeutic and toxic limit seems to be too low to warrant its safe administration (Chopra and Mukerjee: *Ind. Journ. Med. Research:* January, 1933).

De and Choudhuri (Calcutta University Thesis, 1919) have isolated from the seed two glucosides, thevetin and thevetidin.

Bengal: Chinakarab, Kokilphul, Kolkaphul—; *Bombay:* Pilakaner, Pilvalakaner, Zardkunel—; *Burma:* Hpayoungban, Molamiyaipan—; *Deccan:* Pilakaner, Pilephulkakaner—; *English:* Bastard Oleander, Exile Oleander, Yellow Oleander—; *Ga:* Abordoritsho, Krortsho, Sibitsho—; *Gold Coast:* Exile Oil Plant, Milk

Bush—; *Gujerati:* Pilakanir, Pilokanera—; *Hindi:* Kaner, Pila, Pilakanir, Zardkunel—; *Madras:* Manjalalari—; *Malay:* Guinnyeh, Mallaie, Mallaye—; *Malayalam:* Pachchaarali—; *Marathi:* Pivalakanhera—; *Mundari:* Marangkanaili—; *Sanskrit:* Ashvaghna, Ashvaha, Ashvamaraka, Ashvanashaka, Ashvantaka, Ashvarodhaka, Chandata, Divyapushpa, Gauripushpa, Haripriya, Hayaghna, Hayamara, Hayamaraka, Hayari, Karavira, Kunda, Nakharavha, Prachanda, Pratihasa, Rangari, Shankudra, Shatakumbha, Shatakunda, Shataprasa, Shitakumbha, Shvetapushpa, Shvetapushpaka, Sidhapushpa, Sthalakumida, Turangari, Vira, Viraka—; *Santal:* Berenjo—; *Tamil:* Pachaiyalari, Tiruvachippu—; *Telugu:* Pachchaganeru—; *Twi:* Nnye me nnyere me, Osibidua, Sibisaba—; *West Indies:* Abia de matto, Ahouai, Jaca, Noix de serpent, Yorre—.

ALLAMANDA Linn.

Shrubs, usually climbing, sometimes small trees, with opposite and whorled leaves, entire and shortly petioled with intra-petiolar glands. Flowers very large, usually yellow, in few-flowered terminal and axillary cymes. Corolla with a short tubular base, then suddenly campanulate, lobes rounded contorted to the left, throat with a ring of ciliate scales. Ovary 1-celled with 2 parietal placentæ and many ovules. Fruit globose with numerous stout green prickles, finally 2-valved.—Species 12.—Tropical America, W. Indies.

A. cathartica Linn. is used medicinally in Brazil and Guiana: *A. schottii* Pohl. in Brazil.

1. **Allamanda cathartica** Linn. Mant. II (1771) 214.

A glabrous or somewhat pubescent, erect or subscandent shrub, 2-4 m. high. Leaves in whorls of three or four, or the uppermost ones scattered, lanceolate or oblanceolate, acuminate, sessile, about 12 cm. long, 2.5-4 cm. wide, the upper surface shining. Flowers shortly pedicelled, yellow, calyx-teeth green, somewhat spreading, lanceolate, acuminate, 1-1.5 cm. long. Corolla about 7 cm. long, the slender part of the tube 3 cm. long, then inflated and about 2 cm. diam., the lobes ovate or oblong-ovate, spreading, rounded, about 2 cm. long.

Distribution: Tropical America.—Widely grown in Indian gardens.

The bark acts as a hydragogue in ascites.

The leaves are a valuable cathartic in moderate doses.

The Mundas use the root as a remedy for snake-bites.

Bombay: Jaharisontakka, Pilikaner, Pivlikanher—; *Canarese:* Arasinhu—; *French:* Jasmin d'Amarille, Orélie de la Guyane—; *French Guiana:* Alamande, Orélie—; *Konkani:* Kanangani—; *Mundari:* Araba—.

RHAZYA Dcne.

Erect glabrous shrubs or undershrubs. Leaves alternate, thick; nerves obscure. Flowers at the ends of the branches, densely cymose, corymbose or subthyrsoid. Calyx short, 5-partite, without glands inside; segments acuminate. Corolla hypocrateriform; tube cylindric, slightly dilated above the stamens, with reflexed hairs beneath the stamens within, throat constricted, hairy inside; lobes 5, short, broad, overlapping to the left. Stamens above the middle of the tube, included; anthers lanceolate, the cells rounded at the base. Disk shortly annular or obscure. Carpels of the ovary 2, distinct; ovules many in each carpel, 2-seriate; style filiform; stigma broadly thickened, sometimes appendiculate with a reflexed membrane, with a very short 2-globose apiculus. Follicles 2, erect, narrowly cylindric. Seeds many, subterete or angled and compressed, truncate or winged at both ends; albumen fleshy; cotyledons oblong, thick; radicle superior.—Species 2.—Arabia, W. Asia.

The leaves are a bitter tonic.

1. **Rhazya stricta** Dcne. in Ann. Sc. Nat. sér. 2, IV (1835) 81.—PLATE 602B.

A small glabrous leafy shrub reaching 0.9 m. high. Leaves yellowish when dried, sessile, numerous, coriaceous, alternate, 7.5-11.5 by 1-2 cm., linear-lanceolate or elliptic-lanceolate, acute, glabrous, base tapering; nerves (except the midrib) obscure. Flowers white, slightly odourous, in terminal and axillary corymbose cymes; pedicels short, stout; bracts lanceolate, acute, pubescent, ciliate. Calyx glabrous; segments 1.5 mm. long, lanceolate, acute. Corolla 1.3-1.6 cm. long; tube inflated in the upper half, with hairs in the throat and

densely silky hairy below the stamens; lobes 2 mm. long, linear-oblong, apiculate. Ovary glabrous, of 2 distinct carpels; style slender; stigma shortly apiculate, the apiculus 2-lobed. Follicles erect, 5-7.5 by 0.6 cm., parallel, cylindric, pointed, straight or slightly curved near the top, pale brown, striately nerved, glabrous. Seeds 1 cm. long, oblong, angular, compressed, shortly winged at the ends and sometimes slightly on the angles; testa strongly rugose, with elevated ridges.

Distribution: Sind, Baluchistan, Waziristan, Punjab.—Afghanistan, Arabia.

The juice of the leaves is given with milk to children for eruptions, and an infusion of them is very useful for sore-throat, low fevers and general debility. The leaves, which are very bitter, are sold in the bazars in Sind, and used in the preparation of bitter tonic infusions.

The fruits and leaves are considered efficacious in cases of boils and eruptions.

In Afghanistan, the roots, stem, leaves, and flowers, are dried and used in infusion for the treatment of syphilis, in all its stages, and of chronic rheumatism, old joint affections and pains of every kind (Duthie).

The plant is used as a cooling medicine in the hills of Jhalawan (Masson).

In Ormera, it is used as a vermifuge and as a medicine for the eyes; in Las Bela, as a remedy for infant diseases, for snake-bite, and for tooth and eye diseases; in Kharan the roots are used as a fever medicine in the form of a decoction in water; at Loralai and Fort Sandeman, a cooling drink is made from the leaves (Hughes-Buller).

Babihan: Rangobul—; *Bolan:* Hayanwarg, Hezhwarg—; *Fort Sandeman:* Urgalami—; *Hindi:* Sundwar—; *Jhalawan:* Hishwarg—; *Kharan:* Hishwarg—; *Kohlu:* Urgalami—; *Kulanch:* Eshark—; *Las Bela:* Sehar—; *Loralai:* Sinwar, Urgalam—; *Mushree:* Ishwarg—; *Ormara:* Hishark—; *Persian:* Iswarg—; *Punjab:* Gandera, Vena—; *Pushtu:* Vargalum, Wargalion—; *Quetta:* Hayanwarg, Hezhwarg—; *Salt Range:* Vena—; *Shahrig:* Rangobul, Urgalami—; *Sind:* Ishwarg, Sainwar, Sewar, Sihar—; *Wozan:* Hayanwarg, Hezhwarg—.

LOCHNERA Reichb.

Annual or perennial herbs or undershrubs. Leaves opposite; axillary glands numerous, in a fringe, the outer long, filiform, the inner minute. Flowers axillary, solitary or in pairs, white or pink. Calyx herbaceous, 5-partite, without glands inside; segments subulate, scarcely imbricate. Corolla hypocrateriform; tube slender, cylindric, slightly inflated over the stamens below the constricted mouth; lobes overlapping to the left. Stamens on the corolla-tube; filaments very short; anthers free from the stigma, ovate-lanceolate, acute, shortly and obtusely 2-lobed at the base. Disk replaced by 2 long linear glands alternating with the carpels. Carpels 2, free; ovules numerous, 2-seriate; style filiform; stigma depressed-capitate, with a long hyaline reflexed frill at the base and a minute obtuse 2-lobed apiculus surrounded by a very short erect membranous rim. Follicles cylindric, slightly spreading. Seeds numerous, small; testa rugose; hilum lateral; albumen fleshy; cotyledons oblong, flat, shorter than the thick radicle.—Species 3.—Tropics.

1. Leaves obovate .... 1. *L. rosea.*
2. Leaves lanceolate, acute .... 2. *L. pusilla.*

L. rosea Reichb. is used medicinally in South Africa, La Reunion, and Queensland.

1. **Lochnera rosea** Reichb. Consp. Reg. Veg. (1828) 134. —*Vinca rosea* Linn. Syst. ed. 10 (1759) 944.—PLATE 604A (under *Vinca rosea* Linn.).

A beautiful herbaceous or somewhat suffruticose plant 0.3-0.6 m. high with deep green polished oval, obovate or oblong leaves and pure white or deep rose-coloured flowers usually paired and sessile in the axils. Base of petiole 2-glandular. Corolla 2.5-5 cm. diam. Follicles 2.3 cm. long.

Distribution: Probably a native of America.—Very common in Indian gardens.

The juice of the leaves is employed in Orissa as an application to wasp stings.

The macerated root is given as a tonic and stomachic in La Reunion.

It is used as a diabetes remedy, particularly in Natal as well as in other parts of South Africa, and in Queensland. It is also used in treating menorrhagia. An infusion of the leaf by the mouth is the usual mode of administration.

Burma: Thembanmahnyoban—; *Ceylon:* Madagascar Periwinkle—; *Dutch Indies:* Indische maagdepalm, Soldatenbloem—; *English:* Red Periwinkle—; *French:* Pervenche de Madagascar—; *Gold Coast:* Madagascar Periwinkle, Old Maid—; *La Reunion:* Guillemette, Rose amere—; *Marathi:* Sadaphul—; *Nasirabad:* Ratanjot—; *Punjab:* Rattanjot—; *South Africa:* Vinca—; *Spanish:* Dominica de Cuba, Flor del principe, No me dejes, No me olvides, Yerba doncella de Java—; *Tagalog:* Cantotan—; *Telugu:* Billaganneru—; *Uriya:* Ainskati—; *Visayan:* Rosassababay—.

2. **Lochnera pusilla** K. Schum. in Engl. & Prantl Pflanzenf. IV, pt. II (1895) 145.—*Vinca pusilla* Murr. in Nov. Comm. Soc. Reg. Sc. Gott. III (1773) 66, t. 2, pl. 1.—PLATE 605 (under *Vinca pusilla*).

An erect annual, 15-45 cm. high; branches numerous, spreading from the base, quadrangular. Leaves 3.8-7.5 by 0.8-2.5 cm., lanceolate, acute, glabrous, with rough margins, base tapering; petioles 3-6 mm. long; axillary glands long, subulate. Flowers white, small, solitary or in pairs, axillary; pedicels short. Calyx 4-5 mm. long, glabrous; segments 3-4 mm. long, lanceolate-subulate. Corolla-tube 8 mm. long, slightly enlarged near the top, the mouth narrow, hairy, the throat glabrous inside; lobes 3 mm. long, oblong-obovate, obtuse, apiculate. Follicles 3.8-5 cm. long, very slender, straight, pointed, membranous, glabrous, striate, diverging. Seeds 2.5-3 mm. long, cylindric, rounded at both ends and with many muriculate ribs, black when ripe.

Distribution: W. Himalaya, Upper Gangetic Plain, Sind, Gujarat, Konkan, Deccan, S. M. Country, Carnatic, Ceylon.

A decoction of the dried plant, boiled in oil, is rubbed on the loins in cases of lumbago (Ainslie).

Malayalam: Kapavila—; *Sanskrit:* Sangkhaphuli, Sangkhi—.

PLUMIERIA Tourn. ex Linn.

Erect trees; branches very thick. Leaves scattered, elongate, nerves numerous, horizontal. Flowers large, in terminal 2-3-chotomous cymes; bracts many, broad, deciduous. Calyx small, 5-fid, eglandular within; lobes broad, obtuse. Corolla salver-shaped, throat naked, lobes overlapping to the left, rarely to the right. Stamens near the base of the tube; anthers obtuse, cells rounded at the base. Disk 0, or lining the calyx-tube. Carpels 2, distinct; style short, stigma 2-lobed; ovules many-seriate in each cell. Follicles linear-oblong or ellipsoid. Seeds oblong or lanceolate, plano-convex, winged, albumen fleshy, thin; cotyledons oblong or ovate-cordate.—Species 45.—Warm America. Several cultivated in many parts of the tropics.

1. Leaves 15-30 cm. long .... 1. *P. acutifolia.*
2. Leaves 12.5-20 cm. long .... 2. *P. rubra.*
3. Leaves rounded or acuminate at top, revolute at the margin, tomentose, beneath .... 3. *P. alba.*

Root cathartic. Bark antiperiodic. Leaves anthelmintic. Milky juice corrosive, antimalarial, and vermifugal.

The following species are used medicinally: in the Malay Archipelago and Cochin China—*P. acutifolia* Poir.—; in the West Indies—*P. alba* Linn.—; in Jamaica—*P. rubra* Linn.—; in Brazil —*P. drastica* Mart., *P. fallax* Muell. Arg., *P. lancifolia* Muell. Arg., *P. phagedaenica* Mart.—; in Guiana—*P. cuneata* Sm., *P. rubra* Linn.—.

1. **Plumieria acutifolia** Poir. Encycl. Méth. Suppl. II (1811) 667.—PLATE 604B.

A small deciduous tree with thick branches and copious milky juice. Leaves spirally arranged, 15-30 cm. long, oblong-lanceolate or oblanceolate, with an intramarginal vein, acute at both ends; petiole 3.8-6.3 cm. long, stout, glabrous. Flowers 5 cm. across, white with a yellow centre, externally tinged with pink, very fragrant,

in terminal panicles; peduncles about 12.5 cm. long. Stamens inserted near the base of the corolla-tube, included. Ovary ½-inferior.

Distribution: A native of Mexico. Cultivated in Indian gardens.

The root bark is bitter, pungent, acrid; heating, carminative, laxative; useful in leprosy, itching, ulcers, pains, ascites.—In general the therapeutic properties are the same as those of *Michelia champaca* (Ayurveda).

The root bark is purgative; useful in gleet, urinary discharges, venereal sores; cures tumours and rheumatic pains (Yunani).

Dr. Hove, in 1787, found the tree growing abundantly on Malabar Hill, in Bombay, and mentions that the inhabitants used it for intermittents, as we do cinchona.

The root bark is a strong purgative, and also a useful remedy in gonorrhœa and for venereal sores. Butter milk is given in cases of excessive purgation after its use. Plasters made of the bark are said to be useful in dispersing hard tumors.

The leaves, made into a poultice, are used to dispel swellings; the milky juice is employed as a rubefacient in rheumatism, and the blunt-ended branches are introduced into the uterus to procure abortion.

The bark is given in the Konkan, with cocoanut, ghi, and rice, as a remedy for diarrhœa; the flower-buds are eaten with betel leaves in ague, and the juice, with sandalwood oil and camphor, is employed as a cure for itch. The sap mixed with cocoanut is used as a remedy for itch.

This plant is known as *Dalana phula* in Northern Bengal, where its milky juice has been tried and found to be an effectual purgative. The dose is as much as a grain of parched rice (*khai*) will absorb, the grain being administered as a pill.

In Chota Nagpur, the leaves and root are used medicinally but that the part best known to the forest tribes of Manbhum is the core of the young wood, which is given to lying-in women, to allay thirst, and for cough.

The Mundas of Chota Nagpur, use the milky juice of the tree medicinally, 3-4 drops sufficing for a purge; a larger quantity is poisonous.

In Porto Rico:—" In small doses (8 to 12 grains) given in emulsion, the milk produces abundant bilious watery stools. The bark is a favourite remedy with the country people for gonorrhœa and gleet. Two ounces of the fresh powdered bark is placed in 8 pints of *eau sucree* and exposed to the sun for four days, being shaken occasionally. A wine-glassful is administered four or five times a day, together with refreshing and mucilaginous drinks, and the use of tepid baths. The action of the drug is at first purgative, afterwards diuretic. An extract of the bark may be used beginning with 3-4-grains daily to be gradually increased to 14 or 15 grains, or a wine (1 oz. to 1 litre) may be given in liquor glassfuls three times a day. The decoction of the bark is a powerful antiherapeutic.

The bark and the fruit are much recommended for the treatment of snake-bite; but both are useless in the antidotal and symptomatic treatment; the fruit is also useless as an external application to the part bitten (Mhaskar and Caius).

A crystalline glucoside, agoniadin, has been extracted for the bark.

In Cambodia, the wood is used as an anthelmintic, and an infusion of the roots is given as a purgative.

Assam: Goalanchi—; *Bengal:* Dalanaphula, Gorurchampa—; *Bombay:* Chameli, Champa, Dolochapa, Gutachin, Khadchampo, Khairchampa, Sonchampa—; *Burma:* Chinachampac, Taroksaga, Tayopsagah—; *Cambodia:* Champei—; *Canarese:* Belchampaka, Champaka, Devaganagile, Ganagala, Gosampige, Kadusampage, Kanagile, Mogaganagile—; *Dehra Dun:* Gulachin, Gulchin—; *English:* Frangipani, Jasmine Tree, Pagoda Tree—; *French:* Bois de lait, Frangipanier—; *Gold Coast:* Frangipani, Temple Flower—; *Gond:* Champapungar—; *Gujerati:* Rhadachampo—; *Hindi:* Chameli, Goburchamp, Golainchi, Gulachin—; *Konkani:* Portugalo champo—; *Madras:* Attalari—; *Malayalam:* Arali, Vellachampakam: Velattalari—; *Marathi:* Khairchampa, Rhuruchapha, Sonchampa—;

Mundari: Golanchi—; *Naguri:* Golainciba, Golaincidaru—; *Persian:* Gulacin—; *Sanskrit:* Devaganagalu, Gosampige—; *Santal:* Gulanj-baha—; *Sinhalese:* Alariya—; *Tagalog:* Calachuchi, Calasusi, Calatsutsi, Carachucha—; *Tamil:* Ilattalari, Kallimandarai, Kuppiya-lari, Navillavalari, Perungalli—; *Telugu:* Arhataganneru, Nuruvara-halu, Vadaganneru, Veyyivarahalu—; *Tulu:* Gosampige, Sampai—; *Uraon:* Gulaici—; *Urdu:* Achin—; *Uriya:* Golochi, Kutokompa, Torato—; *Visayan:* Calatuche—.

2. **Plumieria rubra** Linn. Sp. Pl. 209.

Low tree or shrub. Leaves 12.5-20 cm. long. Cymes spreading; corolla-lobes broadly oval, longer than the tube.

Distribution: Mexico to Guiana and Ecuador; naturalized in W. Indies.

The root bark is a drastic purgative used mostly for blennorrhagia in Guiana. The latex is given in toothache and for carious teeth. The flowers are aromatic and bechic and used as a very popular pectoral syrup.

English: True Frangipani—; *French Guiana:* Frangipanier rose—; *Gold Coast:* Red Frangipani—; *La Reunion:* Frangipanier rouge—.

3. **Plumieria alba** Linn. Sp. Pl. 210.

Leaves rounded or acuminate at top, revolute at margin, tomentose beneath; veins rectangular-transverse. Flowers white.

Distribution: W. Indies.

In Guiana, the latex is applied to ulcers, herpes, and scabies. The seeds are considered hæmostatic. The root bark is purgative, alterative, detergent, and is given for blennorrhagia and herpes; an extract of it is used internally and externally for syphilitic ulcers.

English: White Chumpa, White Frangipani—; *French Guiana:* Bois de lait, Frangipanier blanc—; *La Reunion:* Frangipanier blanc—; *Madras:* Simaiyalari—; *Sanskrit:* Kananakaravira—; *Tamil:* Peru, Perumallari, Perungalli—; *Telugu:* Veyyivarahalu—.

ALSTONIA R. Br.

Trees or erect shrubs. Leaves usually whorled. Flowers in subterminal corymbose cymes. Calyx 5-lobed or 5-partite, without glands inside. Corolla hypocrateriform; tube cylindric, the throat naked or more or less closed by a ring of reflexed hairs; lobes overlapping to the right or left. Stamens near the top of the tube, included; anthers free, subacute. Disk annular or sometimes obscure, or sometimes truncate or lobed. Carpels 2, distinct; ovules numerous in each carpel, many-seriate; style filiform; stigma minute or shortly 2-fid. Follicles 2, linear, slender. Seeds oblong or linear, flattened, peltately attached, often ciliate; albumen scanty; cotyledons oblong, flat; radicle superior.—Species 30.—Indo-Malaya.

1. Follicles 30-60 cm. long .... 1. *A. scholaris.*
2. Follicles 7.5-12.5 cm. long .... 2 . *A. venenatus.*

The bark is much used in malarial fevers. The inner bark is said to be antiperiodic and the outer bark anti-rheumatic.

A. scholaris R. Br. is used medicinally in Cambodia, Java, the Philippine Islands, Macassar; *A. spectabilis* R. Br. in Macassar; *A. congensis* Engl. in the Gold Coast.

The genus is rich in alkaloids. Alstonidine, alstonine, porphyrosine have been isolated from the bark of *A. constricta* F. Muell.; ditamine, echitamine, echitenine from the barks of *A. scholaris* R. Br. and *A. spectabilis* R. Br.; alstonamine from the bark of *A. spectabilis.*

1. **Alstonia scholaris** R. Br. in Mem. Wern. Soc. I (1811) 76.—PLATE 606B.

A tall tree 12-18 m. (under favourable circumstances reaching 27 m.) high with bitter milky juice, glabrous except the inflorescence; bark grey, rough; branches whorled; young branchlets copiously lenticellate. Leaves 4-7 (rarely more) in a whorl, coriaceous, 10-20 by 3.8-6.3 cm., oblong-lanceolate or obovate, obtuse or sometimes shortly and bluntly acuminate, dark green above, pale and covered with a whitish bloom beneath, base tapering; main nerves numerous, nearly horizontal, parallel, uniting in a intramarginal nerve; petioles

6-13 mm. long. Flowers greenish white, in umbellately branched many-flowered pubescent capitate cymes; peduncles 2.5-5 cm. long; pedicels very short; bracts oblong, pubescent. Calyx 2.5-3 mm. long, pubescent; lobes 2 mm. long, oblong, obtuse, ciliate. Corolla-tube 8 mm. long, villous inside, the mouth with a ring of hairs; lobes 5 mm. long, cuneate-oblong, rounded or subtruncate at the apex, pubescent. Disk 0. Carpels pubescent. Follicles 30-60 cm. long by 3 mm. diam., cylindric, pendulous in clusters becoming completely everted after dehiscence. Seeds 6 mm. long, linear-oblong, flattened, rounded and with a fringe of hairs at both ends, the hairs longer than the seed.

Distribution: Throughout India, often cultivated, Ceylon.—Java, tropical Africa, E. Australia.

The bark is acrid, bitter; heating, oleagenous; appetiser, laxative, anthelmintic, galactagogue; good in diseases of the heart, asthma, leucoderma, ulcers, diseases of the blood, "tridosha", pains, tumours; very good for chronic ulcers and caries of the teeth (Ayurveda).

The bark of this tree is medicinally used as an astringent tonic, anthelmintic, alterative and antiperiodic. It is a valuable remedy in chronic diarrhœa and the advanced stages of dysentery. It is also useful in catarrhal fever.

The milky juice is applied to ulcers, and, mixed with oil, in ear-ache.

The tender leaves, roasted and pulverised and made into poultices, act as a useful local stimulant to unhealthy ulcers with foul discharges.

In the Konkan, the bark is given in leprosy, an extract being prepared from the fresh bark and given in milk; it is also prescribed in dyspepsia as an anthelmintic. The juice of the leaves with that of fresh ginger root or zedoary is administered to women after confinement.

The bark, in combination with other drugs, is prescribed for snake-bite (Sushruta, Yogaratnakara) and scorpion-sting (Sushruta).

The Mundas of Chota Nagpur use the bark as a remedy in stomach-ache. The bark is ground with water; the water is strained off and drunk, the residue being rubbed over the pit of the stomach.

A popular remedy in the Philippine Islands much used in fevers and in dysentery. In Cambodia, the bark is used as an astringent, antidysenteric, emmenagogue. It is prescribed in chronic paludism with enlargement of the spleen, and also in liver complaints. The root is given for enlarged liver with pain.

The inhabitants of Macassar use the petioles as an antidote to ipoh.

The bark of this plant is said to be a powerful tonic and antiperiodic. Tincture and decoction were tried in several cases of malarial fever with favourable results. It took a much longer period than quinine to check intermittent fevers, but there is no doubt that it has considerable antiperiodic properties. It acts as a general tonic in combination with ginger. . . . . In my last report I mentioned that its action was very slow. On a further trial of this drug I have found that it does not possess all the virtues attributed to it (Koman).

The bark is ineffective as an antiperiodic in malaria. It is equally ineffective in the treatment of dysenteries, whether amæbic or bacillary; but it is a good remedy for other types of diarrhœa (Caius and Mhaskar).

The bark is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

"Dita" bark has been much studied chemically.

Annam: Cay sua—; *Assam:* Chatian, Satiana—; *Bengal:* Chatiun, Chatwan, Chhatim—; *Bombay:* Satvin—; *Burma:* Lettok, Lettop, Taungmeok, Toungmayobeng—; *Cachar:* Sattni—; *Cagayan:* Andarayan—; *Cambodia:* Popeal Khe—; *Canarese:* Elelehale, Hale, Jantrahale, Kadusale, Kodale, Koduhale, Madale, Mudhol, Mudihale, Pale—; *French:* Alstonie des écoliers, Dita, Dito—; *Hasada:* Catinidaru—; *Hindi:* Chatiun, Saitankajhad, Satiun, Satni, Satwin—; *Ilocano:* Dalipaoen, Dallopaven, Laya—; *Khond:* Chotina—; *Kolami:* Bomudu, Chatin—; *Konkani:* Santon—; *Kumaon:* Chatiun—; *Lepcha:* Purbho—; *Macassar:* Gaboes, Poele, Poelepandak—;

Magahi: Chaile, Chalain—; *Malay:* Pulai—; *Malaya:* Chhatnia—; *Malayalam:* Daivapala, Elilampala, Kotapala, Mangalappala, Mukkampala, Pala—; *Marathi:* Saptaparni, Satuin, Satvin, Satwin—; *Naguri:* Catianidaru—; *Nepal:* Chatiwan—; *Philippines:* Ditaa, Oplay—; *Sanskrit:* Ayugmachchhada, Ayugmaparna, Ayukachhada, Bahuparna, Brihattvaka, Chatraparna, Dalegandhi, Devavriksha, Gandhiparna, Grahanasha, Grahanashana, Grahashi, Guchhapushpa, Jivani, Kshatrya, Madagandha, Munichhada, Palagaruda, Payasya, Saptachhada, Saptaparna, Sarada, Shalmalipatraka, Sharada, Sharadipushpa, Shirarujam, Shuktiparna, Sringiritika, Suparnaka, Sutipatra, Vidha, Vinada, Vinyaka, Vishalatvaka, Vishamachhada, Yugmaparna—; *Santal:* Chhatnia—; *Sinhalese:* Rukattana—; *Tagalog:* Dita—; *Tamil:* Elilaippalai, Maranallari, Mukkanbalai, Palai, Vadirasi—; *Telugu:* Edakulapala, Edakulaponna, Edakularati, Elaramu, Devasurippi, Palagaruda—; *Tiagan:* Pasnit—; *Tulu:* Palembu—; *Uriya:* Chhotina, Kumbaro, Soptorposi—; *Visayan:* Bita, Dita—.

2. **Alstonia venenatus** R. Br. in Mem. Wern. Soc. I, 77; Loddiges Bot. Cab. t. 186; Wight Ic. t. 436.

A shrub usually 1.8-2.4 m. high, sometimes a small tree 6 m. in height, glabrous. Leaves in whorls of 3-6, membranous, 10-20 by 2-4.5 cm., oblong-lanceolate, very finely acuminate, base much tapered; main nerves numerous, very close, parallel, slender, uniting in an intramarginal nerve, midrib strong; petioles 1.3-2 cm. long, but obscure owing to the decurrent leaf-blade. Flowers white, inodorous, in terminal subumbellate pedunculate cymes, the flowers often racemose on the branches. Calyx 2.5 mm. long; lobes 1.6 mm. long, triangular-ovate, acute, ciliate. Corolla-tube 13-22 mm. long, slender, swollen at the top over the stamens, mouth contracted and closed by a ring of hairs, throat hairy at and below the insertion of the stamens; lobes 8 mm. long, oblong, subacute, glabrous. Disk of 2 ligulate glands alternating with the carpels. Follicles 7.5-12.5 by 0.8 cm., stalked, falcately curved, tapering at both ends, beaked, glabrous, striate. Seeds 10-13 mm. long, flattened, linear-oblong, with a tuft of hairs at each end, the hairs shorter than the seed.

Distribution: W. Peninsula.

The ripe fruit is tonic; it is used in syphilis, insanity, and epilepsy.

Canarese: Addasarpa—.

Holarrhena R. Br.

Trees or shrubs. Leaves opposite, membranous. Flowers white, in terminal or subaxillary many-flowered corymbose cymes. Calyx 5-partite or deeply 5-fid, usually glandular inside; lobes small, narrow. Corolla hypocrateriform; tube slender, cylindric, slightly dilated over the stamens, the throat contracted, naked; lobes 5, oblong, overlapping to the left. Stamens near the base of the tube, included; filaments short; anthers lanceolate, free from the style, shortly mucronate, cells rounded at the base. Disk 0. Carpels 2, distinct; ovules many in each carpel; style short filiform; stigma slightly thickened, oblong-fusiform, the tip entire or 2-fid. Follicles 2, elongate, diverging, incurved, terete. Seeds oblong or linear, compressed, concave, tipped with a deciduous coma; funicle in the concavity; albumen scanty; cotyledons broad, complicate; radicle short, superior.—Species 10.—Palæotropics.

1. Leaves elliptic, oblong, ovate or ovate-oblong, obtusely acuminate .... 1. *H. antidysenterica.*
2. Leaves lanceolate or linear-lanceolate, obtuse .... 2. *H. mitis.*

The bark is antidiarrhœal and antidysenteric, and is also in great repute as a febrifuge, astringent, and bitter tonic.

The following are used medicinally in La Reunion—*H. antidysenterica* Wall.—; in West Africa—*H. africana* A. DC.—; in the Gold Coast—*H. wulfsbergii* Stapf.—; in the Congo—*H. congolensis* Stapf.—.

Alkaloids have been isolated from all the species mentioned above:—conessine and norconessine from the seeds of *H. antidysenterica;* conessine from the barks of *H. antidysenterica, H. africana, H. congolensis, H. wulfsbergii;* holarrhenine from the bark of *H. congolensis;* kurchine and kurchicine from the bark of *H. antidysenterica.*

1. **Holarrhena antidysenterica** Wall. Cat. (1828) no. 1672. —PLATE 607.

A shrub or small tree, glabrous or pubescent; bark pale. Leaves 10-20 by 5-11.5 cm., from broadly ovate to elliptic, obtuse or obtusely acuminate, glabrous or more or less pubescent, base usually obtuse; main nerves 10-14 pairs, conspicuous; petioles 3 mm. long, sometimes 0. Flowers white, inodorous, in terminal corymbose cymes 7.5-15 cm. diam.; pedicels slender; bracts small, lanceolate, pubescent and ciliate. Calyx-lobes 2.5-3 mm. long, oblong-lanceolate, acute, ciliate. Corolla puberulous outside; tube 8-13 mm. long, slightly inflated near the base over the stamens, mouth not closed with a ring of hairs, throat hairy inside; lobes about equalling the tube, oblong, rounded at the apex, more or less pubescent. Follicles 20-38 cm. long, 6-8 mm. diam., cylindric, often dotted with white spots. Seeds 8 mm. long or rather more, linear-oblong, tipped with a spreading deciduous coma of brown hairs 2-2.5 cm. long.

Distribution: More or less throughout India, Malay Peninsula.

The bark is bitter, dry, pungent, heating, acrid; anthelmintic; cures dysentery, diarrhœas, fevers, piles, leprosy, "kapha", thirst, skin diseases, diseases of the spleen, biliousness.—The flowers are bitter, acrid, cooling; appetiser, anthelmintic; cure biliousness, diarrhœa, diseases of the blood, leucoderma; cause "vata".—The seeds are bitter, pungent, cooling, appetiser, astringent to the bowels, anthelmintic; cure pains, "kapha", "vata", leprosy, burning sensation, dysentery, skin diseases, biliousness; good in erisypelas, bleeding piles, fatigue, hallucinations (Ayurveda).

The bark is very bitter; vulnerary, styptic; good in headache; strengthens the gums; lessens inflammation, excessive menstrual flow; the smoke is good for piles.—The leaves are astringent, galactagogue, tonic, aphrodisiac; remove pain in the muscles; cool the brain; good in chronic bronchitis, lumbago, urinary discharges; boils, ulcers, wounds; useful to regulate menstruation; used to fumigate the child and the mother after delivery.—The seeds are carminative, astringent, aphrodisiac, tonic; given in affections of the chest, asthma, colic, diuresis (Yunani).

The seeds combined with honey and saffron are made into pessaries which are supposed to favour conception. They are also used after delivery. They are regarded as astringent, febrifuge and useful in fever, dysentery, diarrhœa and intestinal worms.

The bark constitutes the principal medicine for dysentery in the Hindu Pharmacopœia.

In the Goa territory, the natives use the root-bark only. This is also the case in the Konkan, where the root is given in infusion with *Tinospora cordifolia* for fevers of long standing; its juice is also extracted and made into pills with aromatics, as a remedy for diarrhœa and dysentery.

The bark, dried and ground, is, by the Santals, rubbed over the body in dropsy. The fruit is applied in snake-bite, to allay swelling and irritation, and the seeds yield a medicinal oil.

Every part of the plant, except the flowers, is used as a snake-bite remedy (Charaka, Sushruta, Bhavaprakasha, Yogaratnakara, Bapat). The bark and seed are prescribed for scorpion-sting (Charaka, Sushruta, Vagbhata).

All parts of the plant are equally useless in the antidotal treatment of snake-bite. The fruit is also useless when applied externally to the bitten part (Mhaskar and Caius).

Neither the seed nor the bark is an antidote to scorpion-venom (Caius and Mhaskar).

The plant is neither anthelmintic, nor stimulant, nor astringent, nor styptic. It is a bitter which increases appetite and digestive power. Its antidysenteric value compares favourably with that of any of the medicines now in vogue. Its antidiarrhœal properties are not dependent on any chemical constituent in particular, but on the entire bark or seed. It affords a safe, cheap, reliable, and easily administered drug for the treatment of diarrhœic troubles. We recommend as a safe and reliable treatment of diarrhœas the daily administration of 60-120 grains of powdered bark in 3-4 portions (Caius and Mhaskar; 1927).

The simple administration of Kurchi orally gave surprisingly good results (R. Knowles; *Ind. Med. Gaz.*, August, 1928).

"Our experience with the total alkaloids has shown that they have as powerful an action as emetine in their immediate effects on the symptoms of intestinal amæbiasis as well as in their curative value, in such doses as one grain daily by intramuscular injections. We naturally expected that these alkaloids would be equally effective in amæbic affections of the liver. The following case, however, shows the failure of these alkaloids in controlling the symptoms of a case of hepatitis while emetine produced its usual effect" (Chopra and De; *Ind. Med Gaz.*, 1930).

"In chronic amebic colitis, Acton and Chopra found that 4 grains (0.26 gm.) of kurchi bismuth iodide orally twice daily for ten days cured twelve of eighteen cases, but Reed has given 0.5 gm. daily for ten days to five chronic amebiasis sufferers without relieving symptoms or clearing their stools, even temporarily, of *Endamoeba histolytica*" (C. D. Leake; *Journ. Am. Med. Ass.*, Jan. 16, 1932).

"The discordant results, in our opinion, so far as kurchi bismuthous iodide is concerned, are due to:—1. Some fault in the procedure of extraction of the alkaloids from the bark or preparation of the compound, *e.g.*, use of hot alcohol instead of cold.—2. The bark from which the alkaloids are extracted not being mature, being improperly collected, or being imperfectly dried (Acton and Chopra; *Ind. Med. Gaz.*, January, 1933).

Ghosh and Ghosh have isolated from the bark the three alkaloids conessine, kurchine, and kurchicine (*Journ. Ind. Chem. Soc.*, 1928) to which Siddiqui and Parameswaranpillay have added three more: conessinine, holarrhimine, and holarrhine (*Journ. Ind. Chem. Soc.*, 1932).

Arabic: Lasanulaasafirulmurr, Tivraja—; *Assam:* Dudcory—; *Bengal:* Kurchi, Titaindarjau—; *Berar:* Dudhiari, Dudi, Kurakhatto—; *Bhil:* Ankhria—; *Bhumij:* Kurchi—; *Bihar:* Inderjantulkh, Indrajab, Lisanulasufir—; *Bombay:* Dolakura, Dowla, Kura, Pandhrakura—; *Burma:* Letongkyi, Letoukgyi, Lettopgyee—; *Cachar:* Madmandi—; *Canarese:* Hale, Hirekodasige, Kodasige, Kodamurike, Korchu, Kudsalu, Nangu, Sannahale, Vatsaka, Veppale—; *Deccan:* Dolakura, Pandhrakura—; *French:* Conessie—; *Garo:* Madmandi—;

Gond: Girchi, Samoka—; *Gujerati:* Dhowda, Hath, Hathbaha, Indrajwanunjad, Kado, Kadvoindarjou, Kari, Kuda—; *Hindi:* Dhudi, Hat, Karchi, Kari, Karra, Kaura, Kaureya, Karvaindarjau, Kora, Kura, Kureya, Kuar—; *Jaipur:* Karru—; *Kashmir:* Keor, Kewar, Kor—; *Khond:* Pardali—; *Kolami:* Hat, Kuti, Towa—; *Konkani:* Davokudo, Khao, Kodaga, Koru, Kudo, Kura, Kuria, Kurro—; *Koya:* Pal, Pala—; *Kumaon:* Dudhi, Kachri, Kura—; *Kurku:* Kurakat—; *Lambadi:* Nangero—; *Lepcha:* Fajeerip—; *Malayalam:* Kaippakkotakappala, Kotakappala, Pala, Palappatta, Panipalai, Venpala—; *Malto:* Kurdu—; *Marathi:* Bedaki, Kodaga, Kuda, Kurra, Pandharakuda, Pandharakura—; *Mechi:* Dudhali, Dudhkuri—; *Mishmi:* Dudhali, Dudhkuri—; *Nepal:* Karingi, Kirra, Kura—; *North-Western Provinces:* Kuar, Kuer, Kura, Moriya—; *Oraon:* Korkoria—; *Oudh:* Kachri—; *Persian:* Indarjavetalkh, Tukhmeaharetalkh, Zabanekunjashketalkh, Zabanigungishkitalkh—; *Porebunder:* Karikhado—; *Portuguese India:* Coru, Herva do Malabar, Kudo—; *Punjab:* Kawar, Kewar, Kiam, Koeva, Kogar, Kura—; *Ramnagar:* Kwera—; *Reddi:* Pala—; *Sanskrit:* Girimallika, Indra, Indradu, Indrayava, Indrayavaphala, Kahi, Kalinga, Katuka, Kauta, Kautaja, Kita, Kshiri, Kutaja, Mahagandha, Mallikapushpa, Pandura, Panduradruma, Pravrishenya, Pravrishya, Raktanashaka, Sangrahi, Shakra, Shakrapadapa, Shakraparyaya, Shakrashana, Shakravhaya, Shukrashakhi, Tiktaka, Vanatikta, Varatikta, Vatsaka, Vrikshaka, Yavaphala—; *Santal:* Hat—; *Saora:* Peddankudu—; *Tamil:* Erukkalaipalai, Indrabam, Kasappuveppalai, Kalingam, Kirimalligai, Kudagappalai, Kudasam, Kudasappalai, Kulappalai, Palai, Vattagam, Veppalai—; *Telugu:* Amkudu, Chedukodise, Girimalika, Istarakupala, Kakakodise, Kalingamu, Kodaga, Kodise, Kodisepala, Kolamukhi, Kutajamu, Manupala, Pala, Palabarrai, Palakodise, Peddankudu, Vistarakupala—; *Tulu:* Kodanji—; *Uriya:* Kherwa, Krya, Patrukurwan, Pitakorwa, Pittakrya, Potrokrya—.

2. **Holarrhena mitis** R. Br. in Mem. Wern. Soc. I (1811) 62.—*Carissa mitis* Vahl.

A rather tall slender tree, with whitish rather smooth bark, branchlets slender, drooping, with smooth purplish bark, young parts

glabrous. Leaves 3.8-9 cm., on short petioles, oblong-lanceolate, acute at base, acuminate, obtuse, glabrous, thin, usually recurved, veins pellucid, lateral ones much curved. Flowers on rather long slender pubescent pedicels, in short lax corymbose or paniculate cymes, bracts very small, acicular. Calyx-segments very acute; corolla-tube about 1 cm., lobes 1.6 cm., strap-shaped, obtuse. Follicles 30-45 cm. long, linear, cylindrical, smooth. Seed narrow, coma copious, twice as long as the seed, reddish.

Distribution: Endemic in Ceylon.

The wood and the bark are much used as a remedy in fevers and dysentery. The bark is sold under the name of " Kalinda " and is valued as an antiperiodic (Trimen).

Sinhalese: Kirimawara, Kiriwolla, Kiriwallagass—.

Ervatamia Stapf.

Shrubs or small trees, usually glabrous. Leaves opposite; axillary stipules usually distinct; axillary glands small, often numerous. Flowers in terminal or pseudo-axillary usually paired corymbose or umbelliform cymes. Calyx small; lobes 5, free or connate at the base, glandular inside, imbricate. Corolla hypocrateriform; tube cylindric, slightly enlarged towards the naked mouth, rarely near or below the middle; lobes overlapping to the left, rarely to the right. Stamens erect, inserted in the inflated part of the corolla, included; filaments short; anthers linear, acute, 2-lobed at the base, polliniferous and dehiscing throughout their entire length. Disk 0. Carpels of the ovary 2, sometimes slightly coherent; ovules numerous in each carpel, many-seriate; style usually long, filiform; stigma at the level of the anthers, clavate or oblong-ellipsoid with a slender papillose bifid apiculus. Follicles twin, more or less coriaceous when mature, obliquely ovoid to lanceolate, usually curved and beaked, rounded on the back, usually 1-3-keeled on each side. Seeds few to many, enveloped in an orange coloured or red aril, more or

less irregularly ellipsoid, deeply grooved ventrally; testa crustaceous, finely sulcate; albumen copious.—Species 40.—Palæotropics.

A. Branches stout. Leaves large, coriaceous. Peduncles and pedicels very stout. Calyx large. Corolla-tube cylindric, stout
  1. Leaves oblong or obovate- or linear- oblong, tip rounded, base acute .... 1. *E. dichotoma.*
  2. Leaves linear- oblong or -lanceolate, obtusely acuminate, base acute .... 2. *E. heyneana.*

B. Branches rather slender. Leaves membranous. Calyx small. Corolla-tube slender .... 3. *E. coronaria.*

The milky juice is febrifuge and anthelmintic.

1. **Ervatamia dichotoma** (Roxb.) Blatter, nov. comb.—*Tabernaemontana dichotoma* Roxb. Hort. Beng. (1814) 20.—Plate 608 (under *Tabernaemontana dichotoma* Roxb.).

A small dichotomously branched tree, bark pale grey, smooth, branchlets marked with scars of fallen leaves, young parts glabrous covered with a shining resinous coat. Leaves numerous, 10-18 cm., lanceolate-oblong, tapering to base, suddenly and shortly acuminate, obtuse, stiff and coriaceous, dark green above, paler beneath, lateral veins numerous, horizontal, parallel, depressed above, prominent beneath, petiole 1.3-3.2 cm., stout. Flowers few, on long stout pedicels, cymes in axils of terminal pair of leaves, lax, peduncle 5-15 cm., stout, glabrous, bracts small, ovate, fleshy, adpressed. Calyx fleshy at base, segments rounded, glabrous. Corolla 3.8-7.5 cm. diam., tube 2-2.5 cm., fleshy, lobes considerably longer, oblong, obtuse, falcately twisted, often crisped at margin; anthers acute; ovary glabrous, style clavate; ripe carpels about 5 cm., pendulous, horizontally divaricate or reflexed, broadly ovoid, blunt, flat or dorsal, rounded on ventral side, smooth, orange-yellow. Seed 2 cm., finely striate, surrounded by a coat of cirmson pulp.

Distribution: In the warmer parts of Ceylon. Not in India.

The leaves and bark act as purgatives, and are believed to be used in Java as substitutes for senna; the milky sap is also described as cathartic.

The seeds are purgative. They are said to be powerfully narcotic and poisonous, producing delirium and other symptoms similar to those caused by *dhatura*.

Every part of the plant finds its way into the composition of snake remedies (Charaka, Sushruta, Vagbhata, Sharangdharasamhita, Yogaratnakara). The roots, bark, and leaves are ground with water and applied to the wounds (Roberts).

The root and the bark, in combination with other drugs, are prescribed for scorpion-sting (Charaka, Sushruta).

No part of the plant is an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

English: Eve's Apple, Forbidden Fruit—; *Malayalam:* Kunnampala, Utalam—; *Punjab:* Kanerzad, Pilikarbir—; *Sinhalese:* Divikaduru—; *Tamil:* Kandalaippalai, Kattalari, Palai—.

2. **Ervatamia heyneana** T. Cooke, Fl. Bomb. II, 134.—*Tabernaemontana heyneana* Wall. Cat. (1828) no 1573.—PLATE 606A (under *Tabernaemontana Heyneana* Wall.).

A shrub or small tree 2.4-4.5 m. high; bark grey, rough. Leaves 7.5-20 by 3.2-7.5 cm., coriaceous, oblong or oblong-lanceolate, shortly acuminate, glabrous, base acute; main nerves 12-16 pairs; petioles 8-20 mm. long, dilated at the base. Flowers in pedunculate many-flowered cymes; peduncles 2.5-5 cm. long; pedicels 1.3-2.5 cm. long; buds clavate, rounded at the apex. Calyx 5 mm. long, coriaceous, glabrous; lobes 2 mm. long, broadly oblong, obtuse, with membranous margins. Corolla-tube 1.6-2.5 cm. long, inflated near the top; limb (when expanded) 2.5 cm. across, with obtuse crisped lobes overlapping to the right. Follicles 2.5-3.2 by 1-1.3 cm., yellow when ripe, subsessile, curved, somewhat boat-shaped, usually with a short beak which is often recurved, and 2 sharp side-ribs. Seeds 8 mm. long, surrounded by a red pulp.

Distribution: Konkan, S. M. Country, N. Kanara, W. Ghats in Malabar and Travancore up to 3,000 ft.

The medicinal properties are the same as those of *E. coronaria*. In Pudukkota, the flowers are used in inflammation of the cornea.

Canarese: Bilikodsalu, Halmeti, Maddarssa, Nagarkuda—; *Marathi:* Naglkudo, Pandrakura—.

3. **Ervatamia coronaria** Stapf in Dyer Fl. Trop. Afr. IV (1902) 127.—*Tabernaemontana coronaria* Willd. Enum. Hort. Berol. (1809) 275; Wight Ic. t. 477.—PLATE 609 (under *Tabernaemontana coronaria*).

A glabrous evergreen dichotomously branched shrub, bark grey, juice milky. Leaves opposite, 7.5-15 by 2.5-5 cm., elliptic or elliptic-lanceolate, acuminate, narrowed towards the base, glossy green above, paler beneath, soft, margins wavy; petiole 5-7.5 mm. long. Flowers 2.5-5 cm. across, white, in solitary or twin 1-8-flowered cymes at the bifurcations of the branches. Peduncle very short to 5 cm. long; pedicels variable. Calyx 3.8 mm. long, 5-cleft, lobes broadly ovate. Corolla salver-shaped, tube slender, 1.8-2.5 cm. long, swollen below the middle; lobes 5, spreading, overlapping to the left in bud. Stamens included, inserted below the middle of the corolla-tube; anthers free, acute, 2-lobed at the base. Ovary of 2 distinct carpels; style filiform, tip 2-lobed, papillose; ovules numerous, multiseriate. Follicles 2, 2.5-3.8 cm. long by 1 cm., sessile or stipitate, glabrous, divaricate, 1-3-ribbed, orange or bright red within, narrowed into a slender curved beak. Seeds 7.5 mm. long, irregular in shape, dull brown and minutely pitted, enclosed in a red pulpy aril.

Distribution: Upper Gangetic Plain, Garhwal, E. Bengal, Khasia Hills, Assam, Burma, N. Circars, hills of Vizagapatam.—Trinidad. Cultivated in many parts.

The root is acrid, bitter, with a flavour; heating, astringent to the bowels, alexipharmic, digestible; useful in "kapha", biliousness, and diseases of the blood (Ayurveda).

The root has a bitter bad taste; emmenagogue, aphrodisiac, tonic, purgative; tonic to the brain, the liver, and the spleen; removes bad humours; useful in paralysis, weakness of the limbs, strangury; lessens pain in the limbs and the joints; cures scorpion-sting, epilepsy; its charcoal is good in ophthalmia.—The oil is good for epilepsy (Yunani).

The wood is employed medicinally as a refrigerant.

The milky juice mixed with oil is rubbed into the head to cure pain in the eyes; the root chewed relieves toothache; rubbed with water, it kills intestinal worms; with lime juice it removes opacities of the cornea. It is very cooling in ophthalmia.

In Western India, the milk has the reputation of being very cooling, and is applied to wounds to prevent inflammation.

Arabic: Asarun—; *Bengal:* Chameli, Tagar, Tagur, Tugur—; *Bombay:* Tagar—; *Burma:* Zalat—; *Canarese:* Kottuhale, Nandibatlu, Nanjavatta—; *English:* Wax Flower—; *Gujerati:* Sagar, Tagar—; *Hindi:* Chandni, Chandui, Sugandabala, Taggai, Taggar—; *Lepcha:* Fajeerip, Krim—; *Malay:* Bunga china, Bunga susu, Manda kaki, Susun Ketapa—; *Malayalam:* Kuttampale, Nantiyavattam, Takaram—; *Marathi:* Ananta, Gondetagara, Sagar, Tagar—; *Mundari:* Atalba, Gadasur—; *Nepal:* Asuru, Tagar—; *Sanskrit:* Ashvathabheda, Gajapadapa, Kshayataru, Kshiri, Nandi, Nandivriksha, Nandyavarta, Prarohi, Sthalivriksha, Tagara, Taravata, Vanaspati, Vishnupriya—; *Tamil:* Adukkunandiyavattai, Kuruduppalai, Nandiyavarttam, Pattidai, Perunandiyavattam, Valamburi—; *Telugu:* Gandhitagarapu, Nandivardhanamu—; *Tulu:* Kokke—; *Urdu:* Asarun, Tagar—; *Uriya:* Kato-Katochompa, Molliphulina, Togoro—.

PARSONSIA R. Br.

Climbing shrubs. Leaves opposite. Flowers small, white, in terminal or axillary dichotomous cymes or thyrses. Calyx 5-partite, glandular or naked or with 5 scales inside. Corolla hypocrateriform; tube short, cylindric or subglobose, the throat naked; lobes 5, very slightly overlapping to the right. Stamens inserted on the tube; filaments often twisted; anthers ½-exserted, oblong-lanceolate or linear, acute, conniving round the stigma and adhering to it, the cells produced at the base into empty rigid appendages. Disk of 5 lobes or scales. Ovary 2-celled; ovules many in each cell; style filiform, the top dilated, truncate; stigma columnar or elongate-conic. Fruit cylindric, the carpels cohering for a long time, at length separating from the 2 placentæ. Seeds linear or oblong, attenuated and comose at the apex; albumen scanty; cotyledons oblong-linear, flat; radicle superior.

—Species 10.—Malaya, Australia, Polynesia, New Zealand.

The genus is therapeutically inert.

1. **Parsonsia spiralis** Wall. Cat. (1828) 1631.—*Heligme Rheedei* Wight Ic. t. 1303.

A perennial twining glabrous shrub. Leaves large, subcoriaceous, 7.5-15 by 3.8-9 cm., elliptic- or oblong- lanceolate, acuminate, glabrous, base rounded, or acute; main nerves 6-8 pairs; petioles 1.3-2 cm. long. Flowers greenish, in paniculately corymbose axillary cymes 3.8-7.5 cm. diam.; peduncles variable in length, 2.5-10 cm. long; pedicles 6-10 mm. long; bracts minute, ovate, acute. Calyx 4 mm. long, glabrous; lobes 3 mm. long, ovate-triangular, subacute, each with a scale at the base inside. Corolla 10 mm. long; tube pubescent inside; lobes rather longer than the tube, thick, oblong, obtuse. Disk of 5 triangular lobes. Stamens inserted in the tube near its base; filaments spirally twisted together, thickened and pubescent at the base; anthers ½-exserted. Fruit 12.5-18 by 2 cm., coriaceous, cylindric, sharply pointed, straight, glabrous, the constituent carpels at length separating. Seeds 1.3-1.6 cm. long, linear, slender, narowed at the tip, glabrous, striate, the hairs of the coma reaching 3.8 cm. long.

Distribution: Assam, Lower Bengal, Lower Burma, W. Peninsula, Ceylon.—Malaya, China.

The juice of the plant is given internally in insanity.

VALLARIS Burm. f.

Twining shrubs. Leaves opposite, minutely dotted. Flowers white, in axillary or supra-axillary dichotomous cymes, sometimes reduced to fascicles. Calyx 5-partite, glandular or not inside; segments narrow. Corolla hypocrateriform or subrotate, the throat naked; lobes broad, overlapping to the right. Stamens inserted at the top of the corolla-tube; filaments very short or clavate; anthers exserted, acuminate, conniving in a cone round the stigma and adherent to it, the connective furnished with a more or less conspicuous fleshy tubercle at the back, the cells produced at the base into short rigid

appendages. Disk annular or cupular, with 5 lobes or scales. Carpels of the ovary 2, at first connate; ovules many in each carpel; style filiform, pubescent; stigma thick, obscurely annulate near the base. Fruit oblong, acuminate, the carpels at length separating. Seeds 2-seriate, ovate, acuminate or beaked, compressed, comose at the apex; albumen scanty; cotyledons flat, thin; radicle superior.—Species 6.—Indo-Malaya.

The latex is a mild irritant and a vulnerary.

1. **Vallaris solanacea** O. Ktze. Rev. Gen. Pl. pt. II (1891) 417.—*V. Heynei* Spreng. Syst. I (1825) 635.—Plate 610 (under *V. Heynei*).

A large woody climbing shrub; bark thick, yellowish white, smooth. Leaves 5-11.5 by 2.5-3.3 cm., elliptic-lanceolate or oblong-lanceolate, acutely acuminate, usually glabrous, pellucid-dotted, base acute; petioles 8-13 mm. long, with glands in the axils. Flowers white, fragrant, in axillary 3-10-flowered lax cymes; peduncles slender, glabrous or pubescent; pedicels pubescent, often decurved; bracts linear-lanceolate, acute, pubescent. Calyx pubescent, 3 mm. long; lobes 2.5 mm. long, ovate-oblong, obtuse or subacute, pubescent, a little shorter than the corolla-tube, ciliate. Corolla finely pubescent outside; limb nearly 2 cm. across, spreading, divided about ½-way down into 5 obovate obtuse lobes; corolla-tube 3 mm. long. Anthers acute, connivent into a sharp cone, exserted; filaments broad, linear, pubescent. Disk with 5 oblong obtuse ciliate lobes. Ovary hairy; style hairy; stigma pointed. Fruit 10-15 by 3.8-5 cm., straight, somewhat acuminately pointed, fibrously striate. Seeds 1.3 cm. long, ovoid, beaked; coma 2 cm. long of silvery white hairs.

Distribution: More or less throughout India, often cultivated, Ceylon.

The milky juice is a mild irritant. Applied to old sores and sinuses it excites some degree of inflammation in them and thereby expedites the process of healing.

Bengal: Haparmali, Ramsor—; *Burma:* Kinbotgyi—; *Hindi:* Chamarikivel, Dudhibel, Ramsar—; *Kumaon:* Dudhi—; *Mundari:* Adakared—; *Sanskrit:* Bhadramunja, Bhadravalli, Visalyakrit—;

Telugu: Nagamalle, Nityamalle, Palamalletivva, Puttapodarayarala, Visalyakarani—; *Uriya:* Bonokonerinoi, Haporomoli—.

WRIGHTIA R. Br.

Shrubs or small trees, often with slender cord-like branches. Leaves opposite. Flowers red, white, or yellow, in terminal or pseudo-axillary cymes. Calyx short, 5-partite, with glands or scales inside. Corolla hypocrateriform; tubes cylindric, usually short, with a corona of 5 or 10 erect usually fimbriate scales in the throat which are either distinct or united into a ring; lobes overlapping to the left. Stamens at the top of the corolla-tube; filaments short, dilated; anthers exserted, sagittate, conniving around and adhering to the stigma, the cells with solid spurs at the base. Disk 0. Carpels of the ovary 2, free or connate; ovules many in each carpel. Follicles connate or distinct. Seeds linear, attenuated at the apex, with a deciduous coma at the lower end; albumen scanty or 0; cotyledons broad, convolute; radicle short, superior.—Species 14.—Palæotropics.

1. Fruit without white tubercles, not grooved at the junction of the carpels .... 1. *W. tinctoria.*
2. Fruit rough with white tubercles, grooved at the junction of the carpels .... 2. *W. tomentosa.*

The genus is not therapeutically defined.

1. **Wrightia tinctoria** R. Br. in Mem. Wern. Soc. I (1811) 74.—PLATE 611.

A small deciduous tree; bark scaly, smooth; young parts glabrous or puberulous. Leaves variable, 7.5-15 by 2.5-5.7 cm., elliptic-lanceolate or oblong-lanceolate, acuminate, glabrous or the young leaves puberulous beneath, base acute or rounded; main nerves 6-12 pairs; petioles 3-4 mm. long. Flowers white, fragrant, in lax terminal cymes which are sometimes 12.5 cm. diam. with slender spreading dichotomous branches; bracts minute, ovate. Calyx glabrous, glandular inside; segments 2.5 mm. long, oblong, rounded at the apex and with membranous margins. Corolla-tube short, 3 mm. long; lobes 8 mm. long, oblong, obtuse; corona of numerous linear scales, some inserted with the filaments and some on the corolla-lobes. Fruit

of 2 distinct pendulous follicles, 25-50 cm. by 6-8 mm., cylindric, slightly tapering to both ends, glabrous, striate, cohering at first at the tip only. Seeds 1.3-2 cm. long, pointed at the apex, with a deciduous coma often more than 3.8 cm. long at the base.

Distribution: Rajputana, Central Provinces, Deccan, Konkan, S. M. Country, Circars, W. Ghats of Madras Presidency, Ceylon, Burma.—Timor.

The bark and the seeds have the same therapeutic properties as those of *Holarrhena antidysenterica.*—The bark is specially useful in piles, skin diseases, and biliousness (Ayurveda).

The bark and the seeds have the same properties as those of *Holarrhena antidysenterica* (Yunani).

The bark is used as a tonic, and the seeds as an aphrodisiac.

Neither the bark nor the seeds can be recommended for the treatment or diarrhœic troubles (Caius and Mhaskar).

The general appearance of the seeds is such as to make their detection very difficult if mixed with seeds of *Holarrhena antidysenterica;* but as the therapeutic value of the seeds of the two plants is the same both as regards nature and intensity, adulteration would be of no practical importance. The external characters of the barks are such as to preclude adulteration, the rust-brown colour of *H. antidysenterica* being characteristic; the bitter rust-red powder given by the latter is totally different from the tasteless grey powder obtained from *W. tinctoria* (Caius and Mhaskar).

Arabic: Lasanulaasafir, Lasanulaasafirulhalo—; *Banda:* Dudhi—; *Bengal:* Indarjou, Indrajau—; *Bhil:* Kordi—; *Bombay:* Bhurkuri, Kalakado, Kalakuda, Kalakudi, Kalakura, Khirni, Kuda—; *Canarese:* Beppale, Hale, Hallunovu, Halugale, Kadunili, Kirikodasige, Kodasige, Kodmurki, Kuda, Vepala—; *Deccan:* Indarjou, Mithaindarjou—; *Gujerati:* Indarjou, Kalikari, Mitaindrajawatunjhad—; *Hindi:* Dudhi, Indarjou, Khirni, Mithaindarjou—; *Kadir:* Irumbalai, Irumpala—; *Konkani:* Kalokuddo—; *Lambadi:* Dudiro—; *Malayalam:* Ayyapala, Ichchha, Irumpala, Kotakappala, Pala, Tontapala—; *Marathi:* Godaindrajav, Indrajou, Kalakuda, Kalakudi, Kalakura—; *Meywar:* Khirni—; *Persian:* Ahar, Ahareshirin,

Indarjou, Indarjouveshirin, Zabanekunjashk, Zabanekunjashkeshirin—; *Porebunder:* Dudhali—; *Sanskrit:* Hayamaraka, Madhuindrayava, Svetakutaja—; *Sinhalese:* Vepalarsi, Veppapal—; *Tamil:* Irumbalai, Kumbambalai, Nilambalai, Nilapalai, Palai, Palainilam, Tondambalai, Vetpalai, Veppalai—; *Telugu:* Ankudu, Chittankudu, Chittiyankudu, Jeddapala, Palabaranki, Palavareni, Palaveri, Palumili, Repala, Tedlapala—; *Tulu:* Naikuli—; *Uriya:* Dudhokrya, Krya—.

2. **Wrightia tomentosa** Roem. & Schult. Syst. IV (1819) 414; Wight Ic. t. 443.—PLATE 612.

A small tree reaching 7.5-9 m. high, abounding in yellow milky juice, with opposite divaricate scabrous branches; bark smooth, yellowish grey; branchlets pubescent; young parts densely tomentose. Leaves 7.5-15 by 3.8-6.3 cm., elliptic-oblong, acuminate, tomentose on both sides, drying dark brown, base acute; main nerves 8-14 pairs; petioles 6 mm. long. Flowers malodourous, 2.5 cm. or more across, in short dense erect terminal corymbose tomentose cymes, white when on the tree, turning yellow shortly after being gathered. Calyx pubescent outside, glandular inside; segments 3 mm. long, broadly ovate, obtuse, with ciliate membranous margins. Corolla-tube 5-6 mm. long; lobes 1.3-1.6 cm. long, oblong, rounded at the apex; corona orange, of 5-10 oblong, often laciniate scales. Fruit cylindric, 15-30 by 1.3 cm., with a groove on each side at the junction of the carpels, rough with white tubercles. Seeds 1.3-1.7 cm. long, slender, attenuated at the apex, with a deciduous white coma 2.5-3.8 cm. long at the lower end.

Distribution: Throughout tropical India, Ceylon, Malay Peninsula.

In Chota Nagpur, a preparation from the bark is given in menstrual and renal complaints (Campbell).

The bark and root-bark are believed to be useful in snake-bite and scorpion-stings.

The bark cannot be recommended as an antidiarrhœal drug (Caius and Mhaskar).

The bark is not an antidote to either snake-venom (Mhaskar and Caius) or scorpion-venom (Caius and Mhaskar).

Assam: Atkuri—; *Bengal:* Dudhi, Dudhkoraiya—; *Bombay:* Daira, Dudhi, Kaduinderjao, Tambadakuda—; *Burma:* Lettopthein, Lettoukthein—; *Canarese:* Bilikudegidda, Kadunagalu, Kaduveppale—; *Cuttack:* Harido—; *Ceylon:* Palmadankai—; *Gujerati:* Ruchhalodudhalo—; *Hindi:* Daira, Dharauli, Dudhi—; *Khond:* Palsi—; *Kolami:* Sandikuya—; *Kumaon:* Darula, Dhudi—; *Lepcha:* Lelemnyok—; *Malayalam:* Mayilapala, Nettampala, Nilampala—; *Marathi:* Kalainderjau, Tamdakura—; *Mundari:* Marangkodasing, Toasing—; *Nepal:* Karingi, Kirra—; *Punjab:* Dudhi, Keor, Kilawa—; *Santal:* Atkura, Burumachkunda—; *Tamil:* Palai, Sonaivetpalai, Tondambalai, Vetpalai—; *Telugu:* Kolamukhi, Pala, Peddapala, Puttucheyavalaru, Tedlapala—; *Uriya:* Dudhokrya, Kudelo, Pahukrya—.

NERIUM Linn.

Erect glabrous shrubs. Leaves usually in whorls of three, narrow, coriaceous; nerves slender, very close. Flowers large, in terminal racemose cymes. Calyx 5-partite, glandular within, segments narrow. Corolla funnel-shaped; tube cylindric, expanding above, with 5 fringed scales on the throat, lobes overlapping to the right. Stamens inserted near the mouth of the tube, filaments short; anthers conniving around and adhering to the stigma, tipped with long hairy appendages, each cell produced downwards into a rigid spur-like appendage. Carpels 2, distinct, many-ovuled; style filiform or dilated upwards; stigma with a reflected lobed membrane surmounted by 5 tubercles, tip subglobose. Follicles cylindric, straight, adpressed. Seeds oblong, villous; coma terminal, caducous; albumen fleshy, cotyledons flat.—Species 3.—Mediterranean to Japan.

N. oleander Linn. is used medicinally in Europe, *N. odorum* Soland. in the Philippine Islands.

1. **Nerium odorum** Soland. in Hort. Kew. ed. 1, I (1789) 297.—PLATE 613B.

A large glabrous evergreen shrub with milky juice. Leaves in threes, shortly stalked, coriaceous, 10-15 cm. long, linear-lanceolate,

acuminate, tapering into the short petiole, dark green and shining above, midrib stout; nerves numerous, spreading horizontally. Flowers red rose-coloured or white, fragrant. Calyx-lobes lanceolate. Corolla 3.8 cm. diam., fragrant, lobes rounded. Filaments hairy, appendages of anthers twice as long as the cells. Follicles 15-23 cm. long, rigid, at length separating. Seeds about 1.3 cm. long, tipped with a coma of light brown hairs.

Distribution: Upper Gangetic Plain, Himalaya from Nepal westwards to Kashmir up to 6,500 ft., Salt Range, Waziristan, Baluchistan, Central and S. India. Extensively cultivated throughout the greater part of India as well as in China and Japan.

The medicinal properties are the same as those of *Thevetia neriifolia* (Ayurveda).

The root is bitter; aphrodisiac, tonic good for chronic pain in the abdomen and pain in the joints; very poisonous, but an antidote to snake-venom.—The flower has a bitter sharp taste; good for inflammations, chronic pain in the muscles and the joints, in lumbago, headache, scabies; aphrodisiac (Yunani).

All parts of the plant, *especially the root,* are recognized as *poisonous,* and, as such, are used for criminal and *suicidal purposes;* yet we find, in the Taleef Shereef and other works on Indian Materia Medica, that it is prescribed in leprosy and other diseases. The root of the white-flowered variety is used medicinally by the Mundas of Chota Nagpur.

The root, beaten into a paste with water, is recommended to be applied to chancres and ulcers on the penis (Sarangdhara). The juice of the young leaves is poured into the eyes in ophthalmia with copious lachrymation (Chakradatta).

The Mahomedan physicians describe the root as the most powerful resolvent and attenuant, only to be used externally; taken internally, it acts as a poison upon men and animals. A decoction of the leaves is recommended to reduce swellings, and an oil prepared from the root-bark in skin diseases of a scaly nature, and in leprosy.

The bark of the root and the sweet-smelling leaves of this shrub are considered by the *Vydians* as powerful repellents, applied externally. The root itself, taken internally, acts as a poison, and is but

too often resorted to for the purpose of self-destruction, by the Hindoo women, when tormented with jealousy.

The Mundas use the seeds to poison pigs and jackals.

The root, flower, and leaf are all prescribed in snake-bite (Charaka, Vagbhata); but no part of the plant is an antidote to snake-venom (Mhaskar and Caius).

A chemical examination of the root was carried out by Gadre (*Journ. Ind. Inst. Sc.;* 1916).

Arabic: Difli, Sumelhimar—; *Baluchistan:* Gandeli, Jaur, Jowari—; *Bengal:* Karabi—; *Bolan Hills:* Jaur—; *Bombay:* Ganira, Kanher, Kanhera, Kanir—; *Canarese:* Biliganagile, Biligampuganagile, Kanagile, Karavira, Kempuganagile, Paddali—; *Chinese:* Kia Tchou T'ao—; *Deccan:* Kanirkejur—; *English:* Indian Oleander, Sweet-scented Oleander—; *Fort Sandeman:* Ganderae—; *Gujerati:* Kanera—; *Hindi:* Karber, Kanel, Kaner, Kuruvira—; *Khaisar:* Jaur—; *Kumaon:* Kanur, Kanyur—; *Las Bela:* Kuran—; *Malayalam:* Alari, Arali, Chuvannarali, Kanaviram, Karaviram, Raktapushpam, Satraprasam, Veluttarali—; *Mamu:* Jaur—; *Marathi:* Kaneri, Kanher—; *Mundari:* Kanaili—; *Persian:* Kharzahrah—; *Philippines:* Adelfa—; *Portuguese:* Loureirorosa—; *Punjab:* Ganera, Ganhira, Kaner, Kanira—; *Pushtu:* Ganderai—; *Ranikhet:* Kanpuri—; *Sadani:* Kaner—; *Sanskrit:* Asvamaraka, Chandata, Hayamaraka, Karavira, Pratihasa, Virahuha, Vishavrykshanka—; *Santal:* Rajbaka—; *Shahrig:* Gander—; *Sibi:* Jaur—; *Tagalog:* Baladri—; *Tamil:* Agam, Alari, Alarida, Arali, Asuvabari, Irattaichegappayalari, Irattaichivappalari, Urattaivellaiyalari, Kanaviram, Karaviram, Kaviram, Katturepatta, Kayiram, Sevvalari, Vellalari, Vellaiyalari—; *Tang Masezai:* Gandher—; *Telugu:* Ettaganneru, Ganneru, Karaviram, Kasturipatta—; *Urdu:* Kanir—; *Uriya:* Konero, Konioro, Koniyoro, Korobe, Korobiro, Korobyo—.

ARGANOSMA G. Don.

Stout evergreen climbing shrubs. Leaves opposite. Flowers middle sized, in terminal tomentose cymes. Calyx divided to the base; sepals linear-lanceolate, acuminate, with subulate glands at the

base inside. Corolla hypocrateriform; lower portion of tube short, cylindric, narrower than the upper campanulate or cylindric portion, the upper portion with bearded longitudinal bands behind the anthers; lobes linear or lanceolate, overlapping to the right, nearly straight in bud. Stamens at the base of the upper dilated portion of the corolla-tube, included; anthers sagittate, conniving over and adhering to the stigma, the cells spurred at the base. Disk cupular, 5-lobed. Carpels 2, distinct, the tips usually hirsute; ovules many in each carpel; style short; stigma truncate. Follicles distinct, terete, straight or curved, linear. Seeds ovate or linear-oblong, flattened, glabrous, not beaked, comose; albumen scanty; cotyledons oblong; radicle short. —Species 6.—Indo-Malaya.

1. Leaves with 3 pairs of nerves .... 1. *A. dichotoma.*
2. Leaves with 7-10 pairs of nerves* .... 2. *A. calycina.*

The genus is tonic.

1. **Aganosma dichotoma** K. Schum.—*A. caryophyllata* G. Don. Gen. Syst. IV (1837) 77.—*A. Blumei* Wight Ic. t. 1305 (non A. DC.)—PLATE 614 (under *A. caryophyllata*).

A large and beautiful climber with ovate or elliptic-acute, obtuse, or shortly acuminate leaves 7.5-14 by 3.8-7.5 cm. and lax pubescent corymbose cymes 15-20 cm. diam. of large white flowers 3.8 cm. diam. Sepals linear spreading 2.5-3 cm. Corolla narrowly tubular for 5 mm., then more widely tubular and fluted for 7.5 mm., petals spreading, somewhat obliquely ovate acuminate, tip not or only slightly spiral; twisted in bud. Follicles densely yellow-tomentose when young, spreading or recurved or cornute and cohering by their tips, very variable in size, 10-35 cm. long and 7.5-18 mm. diam. tapering gradually to the tip.

Distribution: Lower Bengal, Monghir, N. Circars, E. Deccan and Carnatic from Ganjam to the Rumpa Hills and the Nellore Veligondas.

The plant is emetic, anthelmintic; useful in bronchitis, leprosy, skin diseases, ulcers, inflammations, purulent discharges from the ear, diseases of the mouth.—The flower is good in the treatment of diseases of the eye.—The leaves cure biliousness and "kapha".

Canarese: Malatilata—; *Gujerati:* Malati—; *Hindi:* Malati—; *Malayalam:* Cherupaval, Kavettavalli—; *Marathi:* Malati—; *Sanskrit:* Jati, Malati, Sumana, Vasanti, Yuvati—; *Telugu:* Gudapalatige, Malati, Palamalle—; *Uriya:* Gonddhomaloti, Maloti—.

2. **Aganosma calycina** A. DC. Prodr. VIII, 432.—PLATE 615.

An evergreen scandent shrub, the young shoots shortly pubescent. Leaves elliptical to elliptically obovate, rounded at the base, shortly acuminate, on a 6-10.5 mm. long puberulous petiole, 5-7.5 cm. long, chartaceous, glabrous, or somewhat pubescent along the midrib beneath, the nerves impressed. Flowers conspicuous, white, forming a terminal, tawny-pubescent, dichotomous cyme; bracts linear-lanceolate, acuminate, tawny and shortly tomentose. Calyx-segments nearly 2.5 cm. long, twany-velvety, linear, subulate-acuminate. Corolla-tube and righthand halves of lobes shortly pubescent, the tube shorter than the calyx. Ovary glabrous.

Distribution: Burma.

According to Sanskrit authors, this plant is heating and tonic; useful in diseases caused by disordered bile and blood.

Sanskrit: Malati—; *Telugu:* Palamalle—; *Uriya:* Maloti—.

TRACHELOSPERMUM Lem.

Climbing shrubs. Leaves opposite. Flowers in lax cymes. Calyx small, 5-partite, glandular or scaly within. Corolla salver-shaped; tube dilated round the anthers; lobes 5, oblique, overlapping to the right, twisted to the left. Stamens attached above the middle of the tube; anthers adhering to the stigma, cells spurred. Disk various. Ovary of 2 distinct carpels; ovules many; style cupular; stigma oblong. Fruit of 2 slender incurved follicles. Seeds crowned with a tuft of long hairs.—Species 8.—India to Japan.

T. jasminoides Lem. is used medicinally in China.

1. **Trachelospermum fragrans** Hook. F. Fl. Brit. Ind. III. 667.—PLATE 613A.

An evergreen climber with stems up to 15 cm. diam. and 18 m. high; often covered with rough spinescent warty tubercles up to 2 cm.

long which sometimes terminate in a leafy shoot or give rise to adventitious roots. Bark reddish brown, roughish owing to the presence of numerous prominent circular lenticels. Blaze 6-10 mm., white or pale yellow mottled with orange-brown, not fibrous, exuding copious milky juice which immediately separates into watery and creamy components. Twigs reddish brown. Young shoots pubescent or brown-tomentose. Leaves 6.3-12.5 by 2-5 cm., elliptic-lanceolate, acuminate, glabrous and rather glossy dark green above, glabrous or pubescent and pale with a fine network of darker veins beneath; lateral nerves 10-15 pairs. Petiole 5-7.5 mm. long, pubescent or brown-tomentose, glandular in the axils. Flowers 1-1.8 cm. diam., fragrant in lax terminal or axillary trichotomous glabrous or pubescent pedunculate panicles 5-12.5 cm. long. Peduncles 2.5-6.3 cm. long. Corolla white with a greenish centre; tube 6-10 mm. long. Follicles 15-30 cm. by 5 mm., cylindric, glabrous or pubescent.

Distribution: Temperate and subtropical Himalaya from Kumaon to Bhutan (not Sikkim), Assam, Cachar.

It is said to possess properties similar to those of *Alstonia scholaris*, for which it is used as a substitute in Kumaon.

Bicol: Bayacto—; *Kumaon:* Dudhi—; *Lepcha:* Yokchounrik—; *Nepal:* Dawarilahara—.

ANODENDRON A. DC.

Scandent glabrous shrubs. Leaves opposite. Flowers small, in axillary or axillary and terminal slender laxly paniculate cymes. Calyx small, 5-cleft, glandular or not inside. Corolla hypocrateriform, the mouth contracted, without scales inside; lobes 5, narrow, overlapping to the right, twisted to the left. Stamens included, below the middle of the corolla-tube; filaments very short; anthers sagittate, conniving round and adhering to the stigma, the cells shortly spurred at the base. Disk annular or cupular. Carpels of the ovary 2, distinct, sunk in the disk and attached to it by their backs at the base; ovules numerous n each carpel; style very short; stigma thick, conical. Follicles divaricate, acuminate, hard. Seeds compressed, ovoid or oblong, beaked, tipped with a long coma —Species 10.—Ceylon to China.

The genus is not therapeutically defined.

1. **Anodendron paniculatum** A. DC. Prodr. VIII (1844) 444; Wight Ic. t. 1309 (fruit and seeds only).—PLATE 616.

A very large branched woody twining shrub; stems fluted, stout; bark brown, thick, rather smooth; young parts glabrous. Leaves 9-15 by 3.8-6.3 cm., thinly coriaceous, elliptic or oblong, shortly and abruptly acuminate, glabrous and shining, base usually rounded; main nerves 12-15 pairs, parallel, slender; petioles 6-16 mm. long, stout. Flowers yellow, small, numerous, in large lax trichotomously branched terminal and axillary glabrous paniculate cymes with filiform brachiate branches; bracts ovate, acute, glabrous; pedicels 3-4 mm. long, slender, glabrous. Calyx glabrous, divided about or rather more than ½-way down; lobes 1.25 mm. long, ovate, subacute. Corolla-tube 2.5 mm. long, pubescent inside, very slightly enlarged a little above the base over the stamens; lobes 4 mm. long, linear, obtuse, slightly falcate, with a few scattered white hairs on the upper surface, overlapping to the right, much twisted to the left in bud. Stamens near the base of the corolla-tube; filaments short, broad; anthers sagittate, 0.85 mm. long, spurs short, divergent. Stigma subsessile, conical, pointed. Follicles 10-15 cm. long, straight, narrowed from a base 2 cm. diam. to an obtuse point, glabrous, terete, hard and woody. Seeds 8-12, elliptic-lanceolate, compressed, 2.5-3.2 cm. long, of which 6 mm. is beak, reddish brown; coma white, 5 cm. and more long, copious.

Distribution: Sylhet, Orissa, N. Circars, Mysore, Konkan, W. Ghats from Bombay and Coorg to Travancore, Ceylon.—Java, Timor, Philippines.

The root is said to possess properties similar to those of Ipecacuanha.

Bombay: Lamtani—; *Canarese:* Maniballi—; *Marathi:* Kavali—; *Sinhalese:* Aswel, Dul—.

ICHNOCARPUS R. Br.

Climbing shrubs. Leaves opposite. Flowers small or minute, in lax many-flowered terminal and axillary paniculate cymes. Calyx

5-fid, glandular or not inside. Corolla hypocrateriform, the throat contracted or villous; lobes narrowed to an obtuse point, overlapping to the right, the upper half of each lobe deflexed in bud. Stamens at or below the middle of the corolla-tube; anthers sagittate, conniving over and adhering to the stigma, the cells spurred at the base. Disk free, 5-lobed. Carpels of the ovary 2, distinct, exserted from the disk, hairy; ovules many in each carpel; style short; stigma ovoid or oblong. Follicles spreading or divaricate, slender. Seeds narrowed at the tip, crowned with a deciduous coma; albumen copious; cotyledons long, flat; radicle short, superior.—Species 6.—Indo-Malaya, Australia.

The genus is tonic.

1. **Ichnocarpus frutescens** R. Br. in Mem. Wern. Soc. I (1809) 62; Wight Ic. t. 430.—PLATE 617.

A large much-branched twining shrub; young branches finely fulvous-tomentose. Leaves 4.5-7.5 by 2-3.8 cm., elliptic-oblong, acute or acuminate, glabrous above, glabrous or slightly pubescent and pale beneath, base usually rounded; main nerves 5-7 pairs, with finely reticulate venation between; petioles 3-6 mm. long. Flowers greenish white, numerous, in axillary and terminal rusty-pubescent trichotomous pedunculate cymes; pedicels 3-4 mm. long, often three together, rusty-pubescent. Calyx fulvous-hairy, divided ½-way down; lobes ovate, acute, without glands inside. Corolla-tube 2.5-3 mm. long with a narrow portion below about 0.85 mm. long, the middle portion of the tube much inflated (almost globular) over the stamens, the upper portion constricted below the lobes; lobes 5 mm. long, pubescent on the upper side with white hairs, broad and oblong at the base, produced at the apex into a long falcate slender twisted acumen which is deflexed in bud and flower. Disk of 5 erect linear lobes, longer than the hairy ovary. Follicles 10-15 cm. by 4 mm., straight or slightly curved, very slender, cylindric, rusty-pubescent at first, afterwards glabrous. Seeds 1.3-2 cm. long, linear, black, not beaked; coma as long as the seed, scanty, white.

Distribution: **More or less throughout India, Ceylon.—China, Java, Australia.**

The root is sweetish; cooling, aphrodisiac; cures "kapha", thirst, vomiting, fever, biliousness, "vata", diseases of the blood; in other respects it behaves like the root of *Hemidesmus indicus* (Ayurveda).

The root is considered to possess alterative tonic properties, and has been employed as a substitute for Sarsaparilla.

The stalks and leaves are used in the form of decoction in fevers.

Bengal: Dudhi, Shyamalata, Syamalata—; *Burma:* Tansapai, Tawsape—; *Canarese*: Gorwiballi, Karihambu—; *Central Provinces:* Bhori—; *Chanda:* Bhori—; *Dehra Dun:* Belkamu—; *Hindi:* Dudhi, Kalidudhi, Siamalata—; *Kolami:* Dudhi—; *Malayalam:* Palvalli—; *Marathi:* Kantebhouri, Krishnasarwa—; *Mundari:* Bumburnari—; *Sadani:* Gitudora—; *Saharanpur:* Belkamu—; *Sanskrit:* Ananta, Bhadra, Chandana, Chandanagopa, Chandanasariva, Chinhadharini, Dirghamula, Dridhabhandini, Gopa, Gopalli, Gopavadhu, Gopi, Gopini, Kalaghantika, Kalapeshi, Krishna, Krishnamuli, Krishnashariva, Krishnavalli, Mahashyama, Masuravidala, Palindi, Sariva, Shariva, Shyama, Shyamalata, Subhadra, Utpalasariva—; *Santal:* Dudhilota—; *Sinhalese:* Kirrivel—; *Tagalog:* Copralin, Hinguio—; *Tamil:* Udargodi—; *Telugu:* Illukkatti, Karampala, Muntagajjanamu, Nallatige, Palativva, Sahadevi—; *Uriya:* Bhunakholi, Kaliyanoi, Kondoranoi, Madhobi, Syamolota—.
